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ABSTRACT

Using Bank Savings Product Design for Empowering Women and Agricultural Development*

This study examines whether the random allocation of single and joint saving accounts to cash crop farmers in rural Ethiopia is associated with changes in decision-making authority and control over resources that ultimately lead to changes in labor effort, schooling allocations, income, consumption, agricultural investments, and crop output. Women and children work more when joint deposit accounts are available. Likewise, meaningful effects on school participation are reported for girls. Consistent with posited channels of intrahousehold bargaining models, women from households assigned to the joint saving treatment group show significant gains in autonomy and control of savings resources, and financial empowerment. While we find substantial gains in subjective wellbeing for single and joint account experimental groups, no meaningful impacts on agricultural crop output, income, and consumption are found. However, a systematic decumulation of livestock assets is observed across households assigned to the joint account treatment group.

JEL Classification: C93, D14, G21, J43, I21, O12, R20

Keywords: bank savings, agriculture markets, labor, schooling, women empowerment, RCT

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Introduction

Savings by the poor have become a priority in the development agenda and savings mobilization strategies for the poor are widely seen as key initiatives for agricultural development, food security, and economic growth (World Bank 2008). Access to formal deposit accounts, however, is still far from reality for 1.7 billion adults worldwide, most of them living in developing countries. This market failure is particularly prevalent in agriculture-based economies due to structural barriers associate with both the supply and demand of financial services, which according to the 2012 Global Findex Database are mainly driven by banking costs, physical distance, and lack of national identification systems. In Ethiopia, the setting of this study, bank saving accounts penetration reaches only 12 percent for adults with primary education, while the gender gap has widened in recent years even as total financing available to the world's poor has increased steadily (World Bank 2017).

Following a number of recent studies that show that access to formal savings accounts benefits households through different outcomes of interest, we implement a financial intervention that provides small subsidies to cover the pecuniary costs of opening formal savings accounts to 1200 agricultural households in rural Ethiopia.[1] Our intervention randomly allocates these subsidies into three groups: a single deposit account in the name of the household head (90% of them are males), a joint deposit account in the name of both husband and wife, and a pure control group. This paper is an attempt to determine how access to single or joint accounts leads to differences in decision-making authority and control over resources that in turn lead to changes in labor and schooling outcomes, agricultural inputs and crop output, which ultimately lead to changes in household income, consumption, and subjective well-being.

By randomly assigning single saving accounts to heads of households and joint saving accounts to both spouses, we exogenously shift the household income-sharing rule between these two treatment groups by providing female spouses an economic opportunity to manage and control household savings through joint saving accounts. In rural Ethiopia, differences in intrahousehold welfare can be traced to differences in bargaining power (Dercon and Krishnan 2000). There is a commonly held norm that Ethiopian women who have more control of household assets have more voice in household decisions and thus, the welfare of women after marriage depends on the control they have over assets during the marriage (Fafchamps et al. 2009). This kind of behavior is consistent with collective models of household-decision-making in which asymmetric preferences for goods and

[1] Among others, see Ashraf 2009, Dupas et al. 2013a, Brune et al. 2016, Callen et al. 2019, Schaner 2017, Field et al. 2021.

services within the household depend on bargaining power, which in turn depends on rules regarding the management of household assets during the marriage (e.g., Browning and Chiappori 1998, Lundberg and Pollak 1993).

Since both single and joint accounts pay the same nominal interest rate of five percent per year, standard neoclassical models predict ownership of formal bank accounts will elicit higher labor effort in response to increases in the value of assets held for the future relative to the present (Callen et al. 2019). Relative to the effective interest rates paid by informal saving vehicles such as cash savings, which are prone to losses due to misuse, theft, social claimants, or personal temptation, the gains in effective interest rate via formal saving accounts lead households to work more. We hypothesize that, relative to single accounts solely own by the heads of households, joint saving accounts would provide female spouses higher autonomy and control of financial resources leading to an increase in bargaining power and associated labor supply responses. These differential labor effects are inconsistent with unitary models of labor supply. Instead, these changes are consistent with collective models of intrahousehold allocation in which increasing the control of household resources by a woman leads to labor supply responses through an increase in her bargaining power and/or shifts in gender norms (e.g., Field et al. 2021, Kabeer 2005). Bargaining power gains also have consequences for investment allocations regarding the education of children of the same gender (e.g., Duflo 2003, Quisumbing and Maluccio 2000). How changes in intra-household allocations of labor and schooling resources would affect agricultural output, inputs, and practices is of substantive interest since household income and consumption depends fundamentally on the volume of cash crops produced.

Several important findings emerge from this study. Administrative bank data shows the overall take-up rate for this intervention is 57 percent, with similar rates between single (54 percent) and joint (60 percent) deposit accounts treatment groups. In terms of usage of the accounts, the share of active users, defined as having at least five deposits over 24 months, reaches 37% of those offered the single and joint saving accounts, or around 65 percent of those who take-up the treatment. Regarding labor supply effects, and relative to a pure control group, we find sizable and statistically significant effects on farm labor among household members assigned to the joint account group, while no meaningful labor changes are observed among household members assigned to the single account group 27 months following the setup of the treatment. Importantly, these positive labor responses are mainly driven by women and children aged 6-14, which suggests that ownership of saving accounts by female spouses triggers important child labor responses. Treatment effects are particularly concentrated in households with otherwise lower levels of female work. Moreover, the analysis of schooling outcomes

shows statistically significant gains for school-aged girls from households randomly assigned to the joint account treatment group. On the contrary, we observe statistically insignificant school impacts for children in households assigned to the single account group. Consistent with posited channels of intrahousehold bargaining models, one observes that women in the joint account treatment group show statistically significantly higher autonomy and control of saving resources and higher gains in financial and labor empowerment relative to women in the single account treatment group, which ultimately leads to meaningful differential resource allocations within households that better reflect preferences toward female-oriented schooling expenditures. These results are not observed in households assigned to the single account treatment group.

Furthermore, higher household labor effort is not accompanied by higher agricultural crop output, but rather by significant impacts on patterns of livestock decumulation for households assigned to the joint-account treatment group. We find some evidence of "lumpy" agricultural purchases of inputs, equipment, and tools, but given large variances, mean impacts are measured imprecisely. Importantly, household demand for hired labor shows negative mean impacts, which suggests substitution effects between household farm labor and outside hired labor to some extent. Furthermore, although we observe shifts in the composition of expenses by treatment status, we find negligible and imprecisely measured mean impacts on household income and food consumption. The lack of income effects is contrary to the assessment of subjective welfare gains that show gains for farming households regardless of their assignment to single- or joint-account treatment groups.

This study contributes to the literature on financial inclusion across four important dimensions. First, we expand the growing literature on saving interventions (e.g., Ashraf et al. 2006, Dupas et al. 2013b, Prina 2015, Karlan et al. 2014a, Schaner 2015) by considering an often-neglected key sector: agricultural households. This study is one of a few existing RCTs, (e.g., Brune et al. 2016, Dupas et al. 2018) that focuses on expanding formal saving opportunities for cash crop farmers in poor settings. Since the agricultural sector in Ethiopia contributes close to half of the country's GDP, this intervention provides useful information for policies that aim to foster agricultural development in impoverished settings. Second, we assess the interaction between savings product design and intrahousehold labor and schooling decision-making among cash crop farming households. We are aware of few studies that assess the link between formal savings and labor supply responses in developing settings (e.g., Callen et al. 2019, Field et al. 2021, Brune et al. 2021). We expand on this important work by randomly allocating different saving products and assessing farm labor responses by all household members, including children aged 6 to 14. Third, we add evidence to the well-

established literature on intrahousehold allocation and decision-making that shows asymmetric preferences for household goods and, thus, rejects unitary models of household decision-making (e.g., Thomas 1990, Bobonis 2009).[2] These results, however, provide no guidance regarding which specific policies affect intrahousehold outcomes. Our financial intervention allows us to assess whether ownership of single vs. joint accounts changes intra-household agricultural and household expenditures. Finally, this study speaks to the literature of women's financial inclusion as one of a recent handful of studies that examine the empowerment effects of savings accounts on women. Ashraf et al. (2010) show that access to an individually held commitment savings product among users of bank accounts causes an increase in female-decision making power within the household in the Philippines. Schaner (2017) shows that assigning ATM cards to individuals with newly opened bank accounts in Kenya increases overall account use, a result driven by men and women with above-median bargaining power. In the same setting, Schaner (2015) offers evidence that spousal conflict over how much to save yields inefficient saving behavior as individuals choose saving levels noncooperatively. Field et al. (2021) report that wage direct deposits into new bank accounts is associated with positive labor supply responses for rural women in India, particularly in households with otherwise lower levels of, and stronger norms against, female work. Our article offers evidence on the role of saving product design i.e., single vs. joint accounts, in empowering women farmers in rural Ethiopia. In restricting legal control to one individual, mainly the head of household, single (private) accounts create a formal barrier to wives that the account holder can use in bargaining, while joint (public) accounts offer a path to shift the household income-sharing rule, and thus, women's bargaining power.

The remainder of this paper is organized as follows: Section 2 describes the setting of this study; section 3 provides institutional details on the saving intervention, sampling framework, data sources, timeline, and a discussion on the gender dimension of the bank savings product design. Section 4 assesses the take-up rates and usage of accounts, while section 5 describes the empirical framework and presents the main findings. Section 6 provides concluding remarks.

2. The Setting

The setting of this study covers two remote, agricultural areas of Ethiopia within the preeminent coffee-producing regions of the country. Our financial intervention covers 12 rural districts (Kebeles)

[2] See Behrman (1997) for a comprehensive review.

across two provinces, Jimma and Sidama, in the west- and south-central parts of the country.[3] These two areas entail an important cultural variation. Orthodox Christian households (55 percent of our sample) mainly populate Sidama, while Jimma is a predominantly Muslim area (45 percent). It is important to notice this intervention takes place in an area where there is no other commercial saving penetration, before or after the introduction of the saving product, and for the duration of the study. Ethiopia is one of the poorest countries in the world, the second-most populous country in Africa, and its agricultural sector accounts for 46 percent of GDP, 85 percent of total employment, and 90 percent of export revenues (FAO 2015).

The farming system is typical of rain-fed agriculture in sub-Saharan Africa, with agricultural income subject to uncertainty mainly due to weather shocks. Each household in our sample constitutes a smallholder farming unit with an average of one hectare of land distributed in seven plots that are mostly dedicated to the cultivation of coffee crops, followed by enset, maize, banana, and avocado. Ethiopia is the birthplace of Arabica coffee that has a strong demand in international markets. These coffee farmers live in dispersed areas due to low population densities and difficult terrain, with poor communication systems and physical infrastructure, but share membership in Fairtrade coffee cooperatives. In our sample, for instance, the proportion of houses with mud floors (70 percent), no electricity (78 percent), and no ventilated pit latrines (78 percent) reflect the living conditions of most farmers in sub-Saharan Africa. Indeed, all farmers in our sample are poor, with an average annual income per capita of around US$100, and an average of four years of formal schooling among heads of households.

This is a setting in which gender segmentation of work and social life is rooted in the cultural and historical influence of East Africa's triple heritage i.e., African, Islamic, and colonial (Bass 2004). In fact, administrative data shows that around 90 percent of heads of households are males.[4] There is a commonly held norm that a farmer is a man who is the main breadwinner, while the female spouse typically has greater household chores responsibilities (Badstue et al. 2020, Galdo et al. 2020). In this regard, baseline data shows that heads of households spend on average twice as much time as their spouses farming household plots, while the latter devote more than three times as much time to

[3] Wayicho, Degara, Moto, Shilicho, Babe, Shabe, Qeway, Tassano, Haro, Omo Boqo, and Omo Gurude.
[4] Headship is not a self-reported status, rather it has an administrative definition in rural Ethiopia closely related to the actual involvement in crop production and formally registered by the Peasant Association (PA) for land allocation purposes. We recorded the headship status from Fairtrade Cooperatives' administrative data.

household chores than the former does. Indeed, gender differential time use occurs from early childhood through old age.

The agricultural sector in Ethiopia is epitomized by financial exclusion. The provision of formal financial services to smallholder farmers is institutionally considered "high risk" because of the inherent variability of agricultural production, seasonality, and lack of formal insurance mechanisms (Amha 2011). As a result, access to formal credit markets is extremely limited in these remote areas due to high transaction costs and inadequate contractual enforcement mechanisms that lead households to resort to informal financial arrangements. No household in our baseline data, for instance, reports lending from formal financial institutions at the onset of this study while only 15 percent reports having bank deposit accounts at the onset of this study.

3. The Intervention

3.1 Sampling Framework

The sampling framework follows from a population of 5100 agricultural households who belong to four Fairtrade coffee cooperatives located in Jimma (2) and Sidama (2) in rural Ethiopia. This sampling frame comes from cooperatives' 2014 administrative records. These records show that membership at these Fairtrade coffee cooperatives ranges from 800 to 1500 farming households with a yearly red-cherry coffee production that ranges from 600 to 1122 kilograms per household. Indeed, this population framework entails geographic, cultural, and agricultural output variation. Based on this population we select a representative sample based on a *2x2* stratified design applied independently to each Fairtrade cooperative. Stratification is based on two variables of interest, level of coffee production and the gender of the heads of households. In doing so, we split the population of Fairtrade members into high- and low-production groups according to whether households' production is above or below the 2014 per-household median of coffee production. The resulting stratified sample is composed of 1,200 households. The allocation of household units to treatment and control groups is then implemented through complete randomization at the household level by simple random methods. As a result, 450 households were assigned to the single-account treatment group, 450 to the joint-account treatment group, and the remaining 300 to a pure control group.

3.2 Outreach and Marketing Efforts

Fieldwork was implemented through a research partnership with the Commercial Bank of Ethiopia (CBE) and the Ethiopian Economic Policy Research Institute (EEPRI). CBE is the leading private

bank in the country with over 13 million nation-wide clients, distributed across 1160 local branches, including four in our areas of intervention. CBE offers standard single and joint deposit accounts, which are interest-bearing deposits that returned account users an annual, nominal interest rate of 5 percent in the period of analysis. Anyone who signs up for a savings account must personally attend a local bank branch, present a valid identification card (ID) along with two passport pictures, and have an initial minimum balance of Birr 25 (US$1.20). No other deposits or any withdrawal fees are applied to holders of deposit accounts at CBE.

In collaboration with Fairtrade Cooperative leaders and CBE marketing officials, and at the onset of the intervention in December 2015, we offered a marketing and financial education workshop following the assessment of focus groups in which it became apparent that knowledge of banking operations and lack of trust in commercial banks were important demand barriers for saving products in this rural setting. Both heads and households and spouses from treatment and control groups alike were invited to public events at the cooperative premises in which they received a half-day financial training on basic bank operations and bank regulations on single and joint deposit accounts, as well as messages reinforcing social capital (trust) on formal banking institutions. These public events were also used as a platform to disseminate public information on the role of savings for coping with emergencies, financing agricultural investments, and serving as a buffer between seasonal income and consumption. At the end of the workshop, farmers were publicly informed that some households will be randomly selected to receive monetary subsidies to open one account, either a single or joint account, that exclusively targets only heads of households and spouses. Likewise, they were publicly informed that the chosen treatment households would receive personalized house visits in the coming days following the public workshop.

3.3 Pecuniary Subsidies

Between December 2015 and January 2016, the public workshop was followed by individual visits to households, in which field workers provided both heads of households and spouses together, detailed information on the size of subsidies and the program's rules, and distributed the corresponding vouchers as one-time subsidies to cover the pecuniary costs involved in the opening of formal saving accounts. The timeline for these visits to households overlapped with the coffee harvesting season because it is in this season that farmers received windfalls of cash from coffee crops. The voucher was tailored according to the randomly assigned treatment group. We set a one-time, small subsidy of 70

Birr (US$ 3.20) and 100 Birr (US$4.50) for the single and joint account treatment groups.[5] These marginally differential incentives are intended to cover the higher costs of opening joint accounts relative to single accounts, i.e., transportation costs and picture IDs for two people rather than one. It was up to the farmers to choose whether to visit the local bank branch that same day or later, as it was also up to the farmers to select the holder of the single savings account, either the head of household or spouse. The pure control group did not receive these subsidies, but they were free to open formal saving accounts, whether single or joint, at the same commercial bank if they chose to do so. Some important treatment features deserve attention. First, farmers received subsidies through time-limited, household-specific vouchers. The value of the voucher was deposited directly into the new savings account when heads of households and/or spouses visited the bank office to set up the account. Second, individuals who chose to take the offer are encouraged to make an out-of-pocket cash deposit of any size to replicate realistic conditions when opening a saving account. Third, although the fieldwork is designed to comply with the original saving product design allocation, our partner bank cannot deny services to treatment households that approached its local branches, complied with all bank procedures, and wanted to open a different type of account than that allocated under treatment. Under the program's rules, therefore, a household with a voucher assigned to the joint account group could end up having a single saving account with the cost of losing the extra 30 Birr that would be associated with the joint account. Similarly, a household assigned to the single account group could end up having a joint savings account and receive an extra 30 Birr. As we will see in section 4, the overall non-compliance rate reached 25%.[6]

3.4. Data Sources and Timeline

We use four different data sources in this study. We have access to institutional data from four

[5]These numbers represent around 0.35% and 0.83% of the annual baseline household earnings. No maintenance or withdrawal fees exist across these two standard saving products.

[6] A cross-randomized, complementary design was also implemented to investigate the role of commitment incentives on take-up rates. Specifically, we randomly split the treatment group households into three equal-sized sub-samples and offered them marginal variations in some salient features of the account. The first randomly assigned group is the 'standard', single- or joint-account treatment households, the default treatment group. The second randomly assigned group was offered an additional reward equivalent to 2.5% on the saving balance if account holders actively used the account within the next six months from setting up the account. This short-term 'active' account usage was defined as having at least two monetary deposits and a positive saving balance in the account as of July 1st, 2016, six months following the intervention. The third randomly assigned group was offered an additional prize equivalent to 2.5% on the saving balance if an account holder did not withdraw her initial deposit until July 1st, 2016. This study does not focus on the take-up impacts for this cross-randomized design and thus, we do not present further results as it is orthogonal to the main intervention.

Fairtrade coffee cooperatives corresponding to the 2014 agricultural production year to identify our population framework. This is the source of our final, stratified sample of 1200 households. Through a partnership with the Commercial Bank of Ethiopia (CBE), we also gain access to administrative records for each new saving account opened as part of our financial intervention. This institutional data includes the date of account opening, type of account, name of account holders, deposits and withdrawal transactions, and saving balances from December 2015 to January 2018.

Household survey data was collected in three rounds. We gathered an initial baseline dataset in July/August 2015 that collects information at the household and individual levels about socio-demographic and labor market variables, land and assets ownership, agricultural production, environmental and personal adverse shocks, food security, and women's empowerment, among other dimensions. A limited first follow-up household survey was collected in December 2016/January 2017, 12 months after the start of the financial intervention. Unlike the baseline household survey, it contained a smaller set of variables, focusing mainly on household-level financial matters such as formal and informal savings, loans, and household income. No schooling or labor-market variables for each household member are gathered as part of this data effort. Lastly, we conducted a final follow-up household survey in March 2017/April 2018, 27 months following the financial intervention. This survey collected information at both the individual and household levels with a focus on schooling and labor-market information from each household member, in addition to standard data on agricultural input and output, income, expenditures, and food consumption. Our analysis focuses on this second wave of follow-up data.

The fieldwork was carried out by personnel from the Ethiopian Economic Policy Research Institute (EEPRI), the research arm of the Ethiopian Economics Association. Figure 1 summarizes the timeline of this intervention along with information on the seasonality of the agricultural production calendar. Importantly, attrition rates are remarkably low as it involves around 2 percent of the original sample over the full-time length of this study. While 1197 Fairtrade coffee households are interviewed in the baseline survey out of the original target of 1200 households, 1185 and 1174 households participate from the first and second follow-up household surveys 12 and 27 months after the intervention took place. Relative to other financial interventions, we take this result as a strength of this study.

Online Appendix Table A1 reports comprehensive balance tests by using the full treatment split and a rich set of variables including most baseline outcomes of interest. Columns 3, 4, and 5 show the p-values of the equality for means test for all treatment groups against each other, i.e., single

account vs. control, joint account vs. control, and single account vs. joint account. These statistics add confidence to the random allocation design since we do not find imbalances in most baseline variables and cannot reject the equality of means across these randomly assigned groups. Likewise, joint orthogonality tests, shown at the bottom of the table, cannot reject balance on household variables across each of the pair-wise sample comparisons.

3.5 The Gender Dimension of Bank Savings Product Design

Following intra-household bargaining models, one would expect gendered effects of savings product design on farm labor and schooling through several channels. First, allocation of single and joint saving accounts, which has no direct influence on preferences on the household's budget constraint, would shift differently the 'distribution factors' that influence the relative power of individuals within the household, factors that are reflected in the Pareto-weights in the household social welfare function (e.g., Chiappori 1992). As a result, female spouses would gain autonomy and control over public (joint) saving accounts, i.e., they would not be solely the *de jure* owners of the account, but they would have effective decision-making control over deposits and withdrawals from these public accounts since information is public (savings are observable), and monitoring is less costly (Ashraf 2009). This is the key distinction with respect to households wherein male heads of households own private (single) saving accounts that entail private information (savings are not observable), leading to more limited saving monitoring and control between spouses. Second, higher autonomy and control over formal joint savings would lead to higher labor and financial empowerment for women. In the absence of wage labor markets, women's weight in financial household decisions is reflected by their work and their children's work on the household farm. Indeed, women's increase in financial bargaining power would translate into higher labor participation particularly in settings where norms about their economic role are misperceived or more restrictive, and thus, labor effects would be particularly concentrated in households with otherwise lower levels of female work. (Field et al. 2021). Third, joint savings accounts could provide women an opportunity to monitor and/or protect income against claims by their husbands for immediate consumption and, thus, to bias household choices toward their own preferences. Thus, women's financial empowerment would ultimately lead to the allocation of resources within the household with a focus on children of the same gender (e.g., Thomas 1990, Quisumbing and Maluccio 2000).

Therefore, addressing the gender dimension of this study requires knowing who controls the single deposit accounts. Specifically, in what percent of cases is the single account controlled by male

heads of households? Administrative data from the bank partner shows that among male-headed households that take up the single bank account, 9 out of 10 solo accounts belong to the male heads of households. Since in Ethiopia, individual ownership of financial assets within marriage is closely related to control and management of those assets (Fafchamps and Quisumbing 2002), this implies that male heads of households are expected to exert control over the newly single saving accounts. Since Ethiopian farms function as unified units under the control of heads of households due to traditional ox-plow agriculture that requires significant physical strength (McCann 1995) and returns to scale in management and experience (Boserup 1965), farming decisions are mostly carried out by male heads of households (Fafchamps et al. 2009). Thus, it is expected that the exclusive control of single deposit accounts by male heads of households would lead to strong preferences over agricultural investments rather than over child human capital investments due to extended patrimonial customs on disposition rules that provide a larger share of the productive asset to those with greater control (Fafchamps and Quisumbing 2002).

On the other hand, it is not clear a priori that co-ownership of joint saving accounts would necessarily disrupt a 'dictatorial' household decision-maker if female spouses are only *de jure* owners of the joint account. Unlike Western developed countries where household finances and assets are often held in common, control over productive assets and finances is more intricate in Ethiopia due to a mix of legal and customary rules that result in a lack of dissociation of management from ownership (Fafchamps 2001). It is well-known that African women who bring more assets into the household have more voice in financial and farming decisions as control and management of assets within the marriage affect women's own labor decisions and individual income (e.g., Jones 1986, von Braun and Webb 1989). For instance, Fafchamps and Quisumbing (2002) reported for rural Ethiopia that women have usually the right to sell dairy products and to keep the generated income because most dairy products are sold in a processed form that is produced by them. In our sample, for instance, and before the intervention, around 80% of women reported having equal decision-making power in the spending of non-agricultural income as their husbands, while one-third reported having no voice at all in farming decisions such as agricultural investments and crops. Since in rural Ethiopia, children have more formal education in households where women have more control and management of household finances (Fafchamps et al. 2009), then we expect that co-ownership of formal saving accounts will benefit child investments in education.

Qualitative evidence collected through interviews with some women in our sample suggests that co-ownership of bank accounts provided an opportunity to enhance their access to and control

over household financial resources because of customary rules that connect management to the ownership of household assets. Joint accounts are seen as an effective way through which they could gradually improve their decision-making position vis-à-vis their husbands, thus enhancing their ability to influence the allocation of labor time and resources within the household. Cooperation rather than conflict is portrayed regarding household allocation preferences. At the same time, women saw themselves as having greater household responsibilities and spending a higher share of their income on household consumption. Thus, whether women have indeed effective control over the new bank joint accounts and whether this control translates into decision-making empowerment are fundamentally empirical questions that we assess in section 5.4.

4. Take-up Rates and Saving Account Usage

Panel A in Table 1 shows administrative bank data on take-up rates. Out of 900 households offered the subsidies, 512 (57 percent) opened deposit accounts at the partner bank, including 54 percent of households assigned to the single account group and 60 percent of households assigned to the joint account group. Among farmers who take-up the treatment, three out of four opened accounts in their originally assigned treatment group (80 percent of those takers assigned to the single account group and 70 percent of takers assigned to the joint account group). Overall, these numbers show a somewhat higher demand for single rather than joint saving accounts. On the other hand, only 5% of control group households opened accounts at the partner bank following the intervention.

Panel B in Table 1 shows bank administrative information on the use of the account for over 24 months. Almost all treatment households who opened a saving account used the account at least once. Out of the 900 households offered the subsidy, 37.5% ended up being 'active' users, as defined by making at least five deposits in the first two years after setting up the account. Conditional on take-up status, Panel C reveals non-linear positive accumulation of saving balances over time, which on average amounts to 356, 1005, and 713 Birr for the treatment group after six, 12, and 24 months following the intervention. Moreover, some differences in the savings accumulation pattern emerge between those households who opened single (809 Birr) and joint (597 Birr) saving accounts, 24-months after the intervention. Regardless of take-up status, the accumulation of monetary savings among treatment households shows higher balances in the first year relative to the second one, which suggests some depletion of resources over time. In terms of banking operations, the average number of transactions among treatment group households that opened bank accounts is seven in the two

years following the intervention. A somewhat higher number of average transactions emerges in households that hold joint saving accounts (7.37) relative to those with single saving accounts (6.72).

Figure 2 shows administrative data for monthly average saving deposits to illustrate the scope and timing of deposits at the partner bank over 24 months. Coffee payments from Fairtrade cooperatives are not deposited into the newly created deposit accounts directly but followed standard, in-person cash payments to farmers. Overall, the profile of the saving deposit streams between single- and joint accounts follows the same pattern over time, although some differences emerge in specific months such as May 2016 and April 2017. Two years after the intervention, the cumulative average saving deposits for the joint account group (4033 Birr) is somewhat higher than that for the single account (3701 Birr), although this mean difference is not statistically different from zero. When looking at the timeline of the deposits, Figure 2 shows important variability related to the seasonality of income streams. Monthly deposits show jumps that coincide with the timing of the annual payments made by Fairtrade cooperatives to farmers for the 2015 harvest season (May 2016) and the 2016 harvest season (April 2017). Two additional saving surges are observed in September/October 2016 and right before the 2017 lean season starts. While the former coincides with the first months of the harvesting season wherein households start receiving cash from coffee crops sell to private merchants and cooperatives, the latter is unexpected and could be related to the sale of dried coffee crop inventories that peaks in that month of the year as farmers prepare for the lean season. Conversely, and as expected, the lowest mean saving deposits occurred in each one of the two lean seasons in July/August 2016 and July/August 2017, in which farmers' income is at its lowest levels over the agricultural cycle.

All bank transactions are done in person at the bank branches since any mobile money/ATM technology is not available. There are no direct costs associated with withdrawals except travel costs and travel time. Thus, it is likely that uptake and usage of the account can vary depending on travel distance. In the Online Appendix Table A2, we assess the determinants of take-up rates by using a rich set of baseline covariates. We follow a probabilistic linear model for the overall take-up, while a multinomial approach is implemented to study the determinants of single and joint accounts take-up. On average, the (Euclidian) distance from the closest bank branch to the farmer's house is 5.4 kilometers. Results show that distance to the bank branches is statistically unrelated to take-up decisions for both single and joint account treatment groups. However, when assessing the usage of

accounts through the frequent user definition, unreported results show a negative and statistically significant relationship for both the single and joint account treatment groups.[7]

5. Empirical Framework and Main Findings

For each outcome of interest, the estimation framework focuses on the intent-to-treat (*ITT*) parameter. We estimate the mean effects of being assigned either to single- or joint-account treatment groups using the following specification:

$$y_{ihs} = \alpha + \beta_1 S_{hs}^{RA} + \beta_2 J_{hs}^{RA} + \mu_s + \varepsilon_{ihs} \qquad (1)$$

where y_{ihs} is the outcome of interest (e.g., farm labor) for individual *i* from household *h* in strata *s;* S_{hs}^{RA} and J_{hs}^{RA} denote indicators for the household's single- and joint-account treatment status. μ_s represents strata dummies from the sample stratifying variables, while ε_{ihs} is the idiosyncratic mean-zero error term.[8] Given the random assignment to treatment and the lack of differential attrition across treatment groups, the OLS framework provides unbiased estimates of β_1 and β_2.

Importantly, while information on outcome variables comes from household surveys, indicators for treatment assignment, take-up, and stratification variables come only from administrative sources. In all tables, the first and second rows report the single and joint accounts treatment impacts following equation (1). Robust standard errors are presented in parenthesis as well as the mean of the corresponding outcome variable in the control group and the estimation sample size. The p-values for both the test of equal treatment effects for single- and joint-account groups and the pooled F-test for the joint significance of the two terms are presented at the bottom of the tables. In any study of this type, where there are many possible outcomes, there is a potential problem of overinterpreting any single significant result. To avoid that, we report multiple outcomes of interest across several dimensions of interest, ensuring no selection of outcomes based on significance levels. Moreover, following standard practices for each "family" of outcomes, we report a normalized index of all the outcomes in the family taken together.[9] Finally, for each of these index outcomes, we report

[7] Unreported results show relative-risk ratios of 0.87 and 0.90 for single and joint account treatment groups, both statistically significant at the 1% level.

[8] Following Bruhn and McKenzie (2009), we used 16 strata dummies from the sample stratifying variables (4 Fairtrade Cooperatives *x* high/low baseline coffee production levels *x* gender of head of household). Similar quantitative and qualitative findings emerge from an alternative specification that does not include any stratifying or control variables.

[9] For each "family" of outcomes, we report an index of dependent variables by computing a simple average of all (normalized) outcome variables in the corresponding family. Normalization is carried out by subtracting the mean in the control group and dividing by the standard deviation in the control group. After computing these indexes, we report the estimated regression coefficients of treatment dummies on the index of dependent variables.

the sharpened False Discovery Rate (FDR) q-values to adjust for multiple hypotheses testing across all the indices following the Anderson procedure (Anderson 2008).[10] Online Appendix Table A3 describes all outcomes used in this study.

5.1 Impacts on Bank Monetary Savings

In this section, we make use of household survey data on ownership of bank saving accounts to complement the administrative data-driven analysis of take-up and usage given in section 4. Columns 1-3 in Table 2 depict intent-to-treat effects on three outcomes of interest: ownership of bank saving accounts, size of bank deposits and size of bank balances, 27 months following the beginning of treatment. Relative to administrative bank data, this survey-based assessment includes information from only one specific period, and it is prone to measurement error. Yet, at the same time, it includes bank information from accounts owned by heads of households and spouses in any bank, whether held at the partner bank or not. Estimation is performed at the household level after aggregating information from bank saving accounts owned either by heads of households, spouses, or both.[11] While the first outcome of interest is not sensitive to extreme values, the size of saving deposits and balances shows a skewed distribution due to the presence of outlier values. For this reason, we present point estimates in levels (with 98 percentile truncation) in Table 2, while we use the inverse hyperbolic sine transformation for these monetary outcomes in Appendix Table A4.[12]

Column 1 in Table 2 shows intent-to-treat effects on the ownership of formal deposit accounts of 29 and 32 percentage points for single and joint account treatment groups, both statistically significant at the 1% level. Moreover, we observe in columns 2 and 3 sizable and statistically meaningful mean effects on monetary deposits and monetary balances of 58% and 66% increase relative to the mean of the control group for the single account treatment group. For the joint treatment group, these mean gains are 31% and 32% although measured without statistical precision due to the large variance of the outcome. The p-value does not reject the null of equal effects for

[10] This procedure controls for the family-wise false discovery error rate for all indices. In this study, we have an experiment with two treatments and ten families of outcomes which include family outcomes for schooling separately for boys and girls aged 6-16.

[11] Only 7% of households report having more than one saving account.

[12] The inverse hyperbolic sine transformation is defined by $log(y_i+(y_i^2+1)^{1/2})$. Online Appendix Figure A1 shows that CDF of mean deposits and mean balances, two outcomes that follow highly skewed non-normal distributions. In both cases, the CDF for the treated group dominates the CDF for the control one. For balances, for instance, the share of households with mean balances below 1000 Birr is 72% and 81% in the treated and control groups. For these subsamples, the mean balances are 442 Birr and 235 Birr, respectively. Around 2% of the sample within each group has mean balances above 30000 Birr.

single and joint account treatment groups. Moreover, when applying the inverse hyperbolic sine transformation to monetary variables, the point estimates are sizable and statistically significant at the 1% level for both single and joint treatment groups and across all variables of interest, as one can observe in the Online Appendix Table A4.

One important question is whether these large gains in bank savings crowded out informal ('under the mattress') savings or any other form of family and community-saving networks (i.e., ROSCAs) that could lead to the breakdown of social insurance.[13] Columns 4, 5, and 6 in Table 2, report the ITT mean effects associated with ownership of other types of monetary savings. While we find negligible and statistically insignificant impacts on monetary savings at ROSCAs, microfinance institutions, and cooperatives, we find negative and statistically significant effects on monetary savings at home ("under the mattress"). These mean reductions in informal savings are somewhat higher among households assigned to the single account treatment group (27% reduction) relative to the joint account treatment group (21% reduction). By looking at the corresponding columns in Online Appendix Table A4, one observes also negative effects for savings "under the mattress" although the point estimates are statistically significant at the 1% level only for the single account treatment group. Consistently, the p-values reject the null of equal coefficients between single- and joint-account treatment groups.

Column 7 in Table 2 shows the point estimates for total savings after adding bank and non-bank saving balances. Results show positive effects for the single (772 Birr) and joint (375 Birr) treatment groups, which represent 17% and 8% increase relative to the mean of the control group. While the point estimates are measured with statistical precision only for the single account treatment group, differential impacts by type of saving account are not statistically meaningful. By looking at the corresponding column 7 in the Online Appendix Table A4, one observes sizable and statistically meaningful impacts for both treatment groups when applying the inverse hyperbolic sine transformation to monetary variables. Furthermore, column 8 in Table 2 shows the estimated effects associate with the family index of seven normalized variables. There is strong evidence of saving accumulation patterns equivalent to 0.13 standard deviations for both single and joint treatment groups, a result statistically significant at the 1% level. Neither unadjusted nor Anderson's adjusted q-values reject the null of zero mean effects for this family of outcomes.

[13] Iqqub and Iddir are traditional, community-based saving associations in rural Ethiopia. While Iqqub provides rotating funding for members, Iddir acts as a risk-sharing network established among family, neighbors, or co-workers which is disbursed to members only during emergencies such as funerals.

Finally, and since bank autonomy might be important for intra-household decisions, we assess whether a woman typically made bank deposits and withdrawals on her own in Online Appendix Table A5. Although we do not have specific information for each transaction, we have survey information collected 27 months after the intervention from female spouses about whether they visited the bank in their own in the past 12 months before the survey. We have 3 categories equal to "2" if she typically visited the bank alone, "1" if she typically visited the bank accompanied, and "0" if no visit happened, and thus, we standardized this score relative to the mean of the control group for ease of interpretation. Following equation (1) we compute intent-to-treat effects of 0.26 and 0.45 standard deviations for the single and the joint account treatment groups, both statistically significant at the 1% level, and with a p-value=0.056 for the test of equal mean effects for both treatment groups. This result shows differential patterns in the degree of bank autonomy and control of savings accounts by female spouses between treatment groups.

5.2 Impacts on Farm Labor

Small scale farming is the most important, and commonly the only economic activity for households in this rural setting. An important body of research has illustrated how poorly functioning credit markets in poor settings can result in a significant misallocation of adult and child labor in agricultural production (Rosenzweig and Wolpin 1993, de Janvry et al. 1992). It has been shown that households work more on the wage market when saving options improve (e.g., Callen et al. 2019). Does this important result extend to unpaid farm labor, including child labor, among individuals with lower formal schooling and numeracy skills?

Table 3 reports ITT impacts on farm labor for the pooled sample of household members aged 6 to 65 and separately across demographic groups of interest: men, women, children at the extensive and intensive margins of work. Labor information is reported by heads of households on behalf of each family member and is based on a relatively long rather than a short questionnaire design. Specifically, the survey contains 12 questions that aim to elicit information about specific farm and non-farm labor activities. The recall time length of these labor variables refers to the past 30 days before the survey date, which overlaps with the coffee harvesting season.

Considering the pooled sample aged 6-65, we observe in columns 1 and 2 positive and statistically significant impacts on farm labor in the joint account treatment group. Relative to the mean of the control group, we observe a 7% increase in farm labor participation and an 8% increase in hours worked. On the other hand, no informative impacts are reported for the single account

treatment group. Consistently, the p-values for the test of equality of coefficients between the treatment groups reject the null. An important question that arises is whether these labor responses to bank saving product design vary by the gender of household members. It is expected that control over household assets would affect the decision on how to allocate one's labor effort as customary rules provide incentives for women to bring more assets into the household and thus, to have more say in the household decision-making (Jones 1986, Fafchamps and Quisumbing 2002).[14] Columns 3 to 6 in Table 3 show that the increase in farm labor observed in households assigned to the joint deposit accounts is mainly driven by women, although it is not statistically different from men's responses according to the p-value reported at the bottom of the table. Relative to the mean of the control group, women's farm labor participation and hours worked increase by 11% and 12.5% in the joint account treatment group, both statistically significant at the 5% level. Women who belong to households assigned to the single account treatment group, on the other hand, show negligible and imprecise mean effects. Indeed, the p-values for the equality of means by saving product reject the null. For men, on the other hand, we observe in columns 3 and 4 uninformative effects for single and joint account treatment groups, although the p-value for the equality of means by savings product design also rejects the null at the 1% level.

For child labor, the expected direction of the saving mobilization impacts is unclear. On one hand, in settings with multiple market failures we would expect that if financial resources are binding, child labor would be used as a substitute for hired labor, particularly if access to saving accounts increases the value of child labor (Basu et al. 2010). On the other hand, a wealth effect may predominate whereby accumulated savings could relax financial constraints, allowing households to reduce child labor in favor of hired labor. Columns 7 and 8 in Table 3 in Panel A reports ITT child labor impacts for children aged 6 to 14. For children living in households assigned to the joint account treatment group, we observe statistically meaningful positive impacts on farm labor participation (13.5%) and hours worked (21%) relative to the mean of the control group. For children from households assigned to the single account treatment group, on the other hand, results are statistically not informative. The p-values for the equality of means by saving product thus reject the null at the 1 percent level. Substantively, these results highlight that the inclusion of spouses as co-owners of formal

[14]In Ethiopia, women participate in various agricultural activities such as soil and manure preparation, weeding, harvesting and post harvest processing. Plowing, on the other hand, occupies a pivotal role in the history of farming: its placement in the exclusive domain of men has resulted in a historical gender division of labor and the evolution of gender norms in Ethiopia (McCann 1995) and Africa (Nunn et al. 2013).

joint savings accounts triggers important child labor responses. Indeed, child labor in Ethiopia is seen as an extension of, and subordinate to, women's work (e.g., Bass 2004, Galdo et al. 2020), which is indeed observed in this analysis as women and child work moves in the same direction for the joint account group. These findings are consistent with the non-separability of household production and consumption decisions (Singh et al. 1986), implying that households differ in the value of children's time conditional on the saving product design. We are not aware of any other study that connects the expansion of formal savings to child labor.[15]

Finally, column 9 in Table 3 reports the mean impacts for the index of dependent variables estimated over the pooled sample. The ITT effects show 0.16 standard deviations for household members assigned to the joint account treatment group, a result statistically significant even after using Anderson's adjusted q-value for multiple hypotheses. On the other hand, the mean index impacts for household members assigned to the single account treatment group lack statistical precision. The fact that the joint account treatment group leads these labor effects might be explained by the visibility of the increase in effective interest rates for holders of joint accounts. After all, these positive effects are mostly driven by women (and their children) who according to patrimonial customs in rural areas of Ethiopia have more disposition over household assets as long as they bring more resources into the household (Fafchamps and Quisumbing 2002).

In Online Appendix Table A6, we report ITT estimates after considering farm, non-farm, and wage work altogether. All qualitative findings stand out as only a relatively small share of individuals (12%) worked outside the household farm.[16] Thus, our conclusions are not affected by the inclusion of other types of work in the computation of total labor supply effects. Unreported results for each one of these additional categories i.e., non-farm household business and wage work, show statistically non-significant labor supply effects for both the single and joint account treatment groups.

If we follow the framework of collective household models in which control of household resources by a woman increases her bargaining power and her ability to participate in the market economy because of empowerment and normative shifts within the household, then one expects that female labor supply impacts would be particularly prominent among women least attached to the labor market at baseline (Field et al. 2021). In Online Appendix A7 we report the ITT impacts for two

[15] One potential concern with OLS estimates of worked hours is the presence of a mass of zeros for the dependent variable, particularly for the women and children subsamples, which could affect the estimation of the standard errors. However, unreported Tobit ITT effects depict similar findings and conclusions.

[16] Relative to the mean of the control group, Online Appendix Table A6 show statistically significant effects only for the joint account treatment group. The estimated effects are 6.2%, 8.6% and 15.6% increase in total labor participation for the pooled sample, women, and children subsamples, respectively.

subsamples of women, those attached and least attached to labor activities, proxied by work and non-work status at baseline. For the joint account treatment group, while one observes large (10 percentage points) and statistically significant farm labor supply effects for women who did not work in the household farm at baseline, small and not statistically meaningful labor supply effects (2 percentage points) are reported for women who worked at the household farm at baseline. The p-value at the bottom of the table rejects equality of treatment effects for these two women subsamples (p-val=0.076). For women who belong to households assigned to the single account treatment group, on the other hand, results are negligible and imprecisely measured across these two subsamples.

5.3 Impacts on Schooling

From a theoretical standpoint, the direction of the effect of savings mobilization on children's schooling outcomes is unclear. On one hand, child labor could hinder the schooling prospects of children if child labor and schooling hours operate as substitutes in this rural setting, particularly if access to savings increases the returns to child labor and/or hired labor and child labor are not easily substitutable (Wydick 1999). However, accumulation of savings could alleviate binding financial constraints and generate a positive impact on schooling by enabling small but continuous investments in school fees, uniforms, transportation, and class materials throughout the school year. In this regard, the analysis of determinants of take-up rates presented in the online appendix showed that the share of household income spent on schooling expenses was an important take-up driver. We then estimate mean effects for this saving initiative on three schooling outcomes of interest: whether a child is currently attending school, weekly hours of school in the past 7 days before the survey date, and overall school attainment. These variables are collected 27-months following treatment and reported by the heads of households on behalf of each child in school-aged 6 to 16.[17]

Table 4 depicts the ITT schooling effects separately for boys and girls. Differential gender impacts emerge depending on the saving product design. Positive school effects emerge for girls that belong to households assigned to the joint account treatment group as the corresponding ITT gains reach 0.052 (6.3%) for 'currently attending school', 1.043 (6.2%) for 'weekly hours of school', and 0.28 (9.8%) for 'years of formal school', which are statistically significant at the 10% level for the first two outcomes. For boys, on the other hand, we do not observe statistically informative impacts for both single and joint account treatment groups. As a result, the p-values for the test of equality of

[17] In these agricultural-driven areas, at baseline, the daily hours of school are only around 4 hours, while the average years of formal schooling is around 3 years for children aged 6-16.

parameters between single and joint accounts show statistical differential impacts for girls but not for boys. Likewise, the p-values for the test of equality of parameters between boys and girls within the joint account group reject the null for two outcomes of interest.

Next, we assess whether assignment to the joint account treatment group ultimately leads to a higher allocation of resources towards schooling expenses relative to the single deposit account group by gender of the child. Under collective bargaining models of resource allocation, changing opportunities for control of joint or single savings accounts lead to changes in a household's sharing rule which ultimately would lead to changes in the allocation of resources. For that purpose, we have information on yearly school expenditures for each child in the sample, as reported by the heads of households 27 months following the intervention. Columns 7 and 8 in Table 4 present the ITT impacts.[18] Positive and statistically significant impacts of 0.32 (38%) emerge for girls from households assigned to the joint account treatment group. For school expenses associated with the single account treatment group, the magnitude of these impacts is much smaller and lacks statistical precision. The p-values for the test of equality of parameters confirm the distinctive responses to school expenditures according to specific saving products (p-value=0.025). For boys, on the other hand, all results are measured imprecisely. The p-values for the test of equality of parameters reported at the bottom of the table do not reject, however, the distinctive responses according to the gender of the child for both the single (p-val=0.792) and the joint (p-val=0.186) treatment groups. This is presumably due to the high variance of the expenditure outcome.

Finally, columns 9 and 10 in Table 4 show the composite index of standardized schooling outcomes. For boys, as expected, we do not observe statistically significant impacts for either arm of the saving treatments. For girls, on the other hand, positive and statistically significant impacts are driven by households assigned to the joint-account treatment group that show statistically significant mean gains of 0.14 standard deviations even after using the more conservative Anderson adjusted q-value to account for multiple testing. Moreover, the p-values for the test of equality of parameters reported at the bottom of the table confirm the distinctive schooling responses according to the specific saving product (p-value=0.014), while the p-values for the test of equality of parameters between boys and girls within the joint account group reject the null (p-value=0.091). These results are in line with independent evidence for Ethiopia that points out that allocation of schooling resources within the household is targeted towards children, particularly girls, when female spouses

[18] We applied the inverse hyperbolic sine transformation to this outcome due to its skewed distribution coming from outlier values.

experience positive changes in autonomy and control of household resources (e.g., Quisumbing and Maluccio 2000, Gebremedhin and Mohanty 2016)

5.4 Impacts on Women's Empowerment

Empowerment is an important mechanism through which the financial inclusion of women might have consequences for intrahousehold economic behavior and engagement with the market economy (e.g, Field et al. 2021, Kabeer 2005, Ashraf 2009). In this subsection, we assess the empowerment effects of bank savings product design on women. In columns 1-3 in Table 5, we present ITT mean effects for three intermediate outcomes related to women's autonomy and effective control over bank saving accounts: women's ownership of a single or joint saving account; an indicator that equals to 1 if a woman, whether the head of household or spouse, has equal or more decision-making power role on household bank deposits relative to her male spouse, 0 otherwise; and a similar indicator for bank savings withdrawals. These three variables refer to a recall period of 12 months before the survey takes place and collected 27 months following the intervention.[19] By looking at the ITT estimated parameters, and relative to the control group, one observes sizable and statistically significant mean gains in women's management and control of savings for both single and joint saving design products. Importantly, the magnitude of these impacts is around two times higher for households assigned to the joint account treatment group relative to the single account treatment group for each one of these outcomes: 0.35 vs. 016 for ownership of bank account, and 0.25 vs. 0.12 for decision-making power for both bank deposits and bank withdrawals. As a result, and across these three intermediate outcomes, the p-value for testing the equality of single and joint accounts parameters decisively rejects the null.

Next, we assess whether women's higher effective control of bank savings leads to women's empowerment within the household in three important domains: control over financial matters, agricultural production, and time allocation. Importantly, these three empowerment outcomes are measured without having a direct link with account ownership and thus, they are not mechanically related to an increase in saving account usage by women. The financial empowerment index is based on three intermediate outcomes that refer to women's decision-making power over the allocation of agricultural revenues, non-agricultural revenues, and management of any type of household savings. For the time allocation empowerment index, we used five intermediate variables related to women's

[19]The number of observations reduces to 1146 due to cases in which female head of households or female spouses are not part of the household.

decision-making power over sending children to school, assigning children's time to farm work, assigning children's time to household chores, and one's own labor participation in the household farm and outside the house. For the production empowerment index, we used women's decision-making power over five intermediate variables: buying/renting farm tools/equipment, selecting crops, negotiating the price of coffee crops, using agricultural inputs such as fertilizer and pesticides, and attending Fairtrade cooperative meetings. Each one of these intermediate variables is categorical and received the value of 2 if she is the only decision-maker or the most important decision-maker, 1 if she equally shares the decision along with a male head of household, and 0 otherwise. A full description of these variables is given in the Online Appendix Table A3. We combine these variables by implementing a principal component analysis and report the first-factor load after normalizing the index relative to the mean of the control group for ease of interpretation. It is important to emphasize that each of these intermediate outcomes is based on information self-reported by women themselves rather than by male heads of households.

By looking at column 4 in Table 5, one observes positive and statistically significant impacts on women's financial empowerment for both saving product designs: while mean effects for the single account treatment group is 0.11 standard deviations and statistically significant at the 10% level, women in the joint account saving group show effects of 0.15 standard deviations, a result statistically significant at the 5% level. The p-value for the test of equality between single and joint treatment group parameters does not reject the null. Columns 1-3 in Online Appendix A8 show the impacts for each one of the three sub-components of the financial index. Positive impacts are led by women's decision-making power on the allocation of non-agricultural household income (0.17) followed by agricultural income (0.12), both statistically significant at the 1% and 10% levels.

A positive though less pronounced effect emerges when considering women's empowerment in the time allocation and production domains, as the magnitude of the mean impacts is smaller relative to the financial empowerment effects. In column 5 in Table 5, time-allocation decision-making ITT mean impacts are 0.085 standard deviations above the mean of the control group for women in the joint account treatment group, while corresponding impacts for the single account treatment group are less than half of that and also lack statistical precision. The p-value for testing equal parameters across saving products does not reject the null though. By looking at the empowerment impacts for each one of the five sub-components in Online Appendix Table A8 (columns 4-8), we observe positive impacts for all intermediate outcomes. For the joint account treatment group, women's decision-making power on their own labor outside the household farm shows the largest and statistically

meaningful impacts (0.12 standard deviations), followed by women's decision-making power on child labor (0.085).

Furthermore, results for the production empowerment index reported in column 6 in Table 5 show a similar picture. Mean impacts are 0.084 standard deviations above the mean of the control group for women in the joint account treatment group, while corresponding impacts for the single account treatment group are almost half of that. Neither of them is measured with statistical precision and the p-value for testing equal parameters across saving products does not reject the null. By looking at the empowerment impacts for each one of the five sub-components in Online Appendix Table A8 (columns 9-13), we observe modest but positive impacts for all intermediate outcomes ranging in size from 0.021 to 0.106 standard deviations with the larger impacts associate with the joint account group relative to the single account group. These differences by saving product design are, however, measured without statistical precision as reported by the p-values at the bottom of the table.

When grouping all empowerment variables in a composite index of standardized empowerment outcomes as in column 7 in Table 5, women who belong to the joint account treatment group show 0.57 standard deviations above the mean of the control group, which is twice the size observed in the single account group (0.28). This leads to a decisive rejection of equal mean effects by product saving design. All results are statistically significant at the 1% level, even after using Anderson's adjusted q-values for multiple hypotheses.

5.5 Impacts on Agricultural Inputs, Livestock, and Crop Output

In this section, we present savings effects on agricultural inputs, crop output, and livestock practices as it has been shown that binding credit market constraints and incomplete insurance limit agricultural investments (Karlan et al. 2014b). We focus on the mean estimates reported by the head of household for the last agricultural season, measured 27 months following the intervention. The one-year recall period likely reduces concerns about seasonality, though it may have exacerbated recall errors due to the absence of record-keeping, a common feature in this type of setting. Columns 1 and 2 in Table 6 report mean impacts for the use of organic and chemical fertilizer (in kgs. per hectare). Positive impacts emerge for these two agricultural inputs, although statistical precision at the 5% level (single account) and 10% level (joint account) is observed only for organic fertilizer. No statistically significant differences by saving product design are reported by the p-values for the test of equality of coefficients. In columns 3 and 4, we show mean effects for the number of new coffee trees (in units) and seeds (in kgs. per hectare) purchased by farmers. The ITT impacts for new coffee plants are positive for both

treatment groups but statistically significant at the 5% level only for the single account one. However, the p-values for the test of equality of coefficients by saving product design do not reject the null of equal impacts. For seeds, on the other hand, we also observe positive mean effects for both the single and the joint account treatment groups, although results are statistically significant only for the latter one. Nonetheless, the p-value of equal effects across saving product design rejects the null. In column 5 we report investments in agricultural tools and equipment which show positive but not statistically meaningful mean effects for both treatment groups. Column 6 shows treatment impacts on household farm labor demand (in units). ITT mean impacts show a reduction of 17% relative to the mean of the control group. However, these mean effects lack statistical precision and are also statistically indistinguishable between single and joint savings treatment groups as reported by the p-value. Given the positive impacts on household farm labor supply presented in section 5.2, this result suggests some substitution between unpaid household labor and remunerated demand for farm labor in households assigned to this saving mobilization intervention.

Next, we consider animal husbandry, which is highlighted in the literature as an asset that can be used as a buffer stock when there are credit constraints (e.g., Rosenzweig and Wolpin 1993, Kazianga and Udry 2006). Column 7 in Table 6 shows the mean impacts on net livestock accumulation, which is computed as the difference between the value of livestock purchases minus the value of livestock sales. To reduce the influence of outlier values, the econometric estimation is done after applying the inverse hyperbolic sine transformation to this variable. Relative to the control group, we observe a statistically significant reduction of the net value of livestock purchases for households assigned to the single (-34%) and joint (-70%) account treatment groups, although statistically informative effects are observed only for the latter one, leading to differential treatment impacts by bank savings product design (*p-value*=0.023). It is worth noting that livestock is the distinctive farm asset that is jointly held by women along with their husbands in Ethiopia. In our sample, livestock joint ownership occurs in 90% of households before the intervention. Although it is difficult to pinpoint a precise explanation of these differential patterns in livestock portfolio decisions due to data constraints, our results suggest that the accumulation of bank savings over time might be partly funded by a reallocation of livestock inventories, particularly for households assigned to the joint account treatment group.

Finally, we aggregate all these agricultural investment outcomes in an index of standardized variables in column 8 in Table 6. By looking at the point estimates, we observe positive but negligible

impacts of 0.05 and 0.03 standard deviations for the single and joint treatment groups, both measure without statistical precision.

Do these positive weak impacts on some input usage/investment lead to higher agricultural crop output? The short answer is no. Column 1 in Table 7 shows the mean effects on coffee crops, the most important cash crop for our sample and measured in kilograms per hectare after taking the inverse hyperbolic sine transformation.[20] We observe positive but statistically non-informative effects on coffee crops for households assigned to the single account, while for households assigned to the joint account, we observe negligible mean impacts, which leads to the no rejection of the test of equal impacts by saving product design. Furthermore, columns 2-6 in Table 7 show the ITT mean effects for the next five most important crops after coffee. We observe mostly negligible and imprecisely measured effects for all crops except for chat, a high-value cash crop, which shows large and significant impacts across households assigned to the joint account treatment group.[21] To aggregate across categories, we compute total output and the value of total output. We present in column 8 in Table 7 the ITT effects only for total output since no qualitative differences in the estimated effects are observed with respect to the value of total output. As expected, no meaningful impacts emerge for total output across both single and joint account treatment groups. Likewise, the standardized index of dependent variables presented in column 9 shows negligible and not significant effects at conventional levels. Not surprisingly, the null of no impact is also not rejected using the more conservative Anderson's adjusted q-values for multiple hypotheses.

All in all, apart from the livestock outcome, we do not observe systematic differential treatment impacts by bank product design in matters related to agricultural production and practices. This result is in line with independent evidence on intrahousehold welfare in rural Ethiopia that suggests that agricultural production and practices decisions are mostly carried out by male heads of households regardless of control and ownership of household assets (Fafchamps et al. 2009, World Bank 2011). The underlying assumption in rural Ethiopia is that a farmer is a man who dominates agricultural decision-making, while women are perceived as having only a supportive role (Sutter 2016, Badstue et al. 2020).

[20] Similar qualitative results are obtained if we use cash crop variables in kilograms instead. Lack of meaningful impacts are also observed for share of cultivated area and share of cultivated coffee area.

[21] Chat leaves are chewed to keep farmers alert and awake and to overcome fatigue. It is s commonly used for social and family ceremonies and it is an important source of fast cash for farmers.

5.6 Impacts on Income, Food Consumption, and Household Expenses

Table 8 shows ITT effects on yearly income separately across each one of four important income measures: agriculture, non-farm household business, labor, and remittances, plus total income. Given the large variance associated with income variables, we used the inverse hyperbolic sine transformation to minimize the influence of outlier values. Since the reliability of recall in agricultural data is important (Beegle et al. 2012), it is worth noticing these results hold independently of the time length of the recall period used in the survey. Unreported results for a shorter length of the recalled period i.e., 90 days, show similar findings.

Column 1 shows that access to bank saving accounts does not translate into higher agricultural income in rural Ethiopia. Estimated effects are negligible and lack statistical precision for both single and joint treatment groups. Similar mean effects are also observed for non-farm household business income (column 2), which is a supplementary activity for a quarter of the sample. Moreover, labor income, which contributes around 9% to the total household income in our sample, shows a large drop in the joint-account treatment group (-33%) and to a lesser extent by the single account treatment group (-14%), as reported in column 3. These negative mean effects on remunerated income lack statistical precision due to large variances, though, and are not statistically different by saving product design (p-value=0.31). Given the meaningful increase in household farm labor supply among joint-account treatment units uncovered in section 5.2, this result suggests a substitution effect away from remunerated labor for household members in the joint account treatment group.

To assess whether inter-household linkages were affected, column 4 shows the mean effects on remittances received by households. We observe sizable negative impacts that are driven by households assigned to the single account treatment group that reports receiving 40% lower remittances, a result statistically significant at the 10% level. For households assigned to the joint account treatment group, we also observe a decrease of remittances (-27%), although these differences are not statistically distinguishable from each other (p-value=0.41). This result indicates that accessing formal saving accounts seems to make farmers less dependent on others over time, echoing earlier results presented by Dupas et al. (2019) for Kenya. Finally, column 5 in Table 8 shows the aggregated yearly household income effects. Point estimates are negligible and lack statistical precision for both treatment groups. This is expected since we observed similar patterns for households' agricultural income, which represents more than 60% of total income in our sample. The zero income effects for these agricultural households are a clear departure with respect to other saving mobilization interventions that showed a large income effect (e.g., Prina 2015, Brune et al. 2016, Callen et al. 2019).

To better understand these lack of income effects, Panel A in Figure 3 presents unconditional ITT quantile treatment effects for total income. We observe that the lack of statistical significance is common across all deciles of income except for the first one. Households assigned to single accounts show higher income heterogeneity than households assigned to joint accounts, as the former show positive income effects in the top three deciles of the income distribution while negative impacts for the bottom five deciles. For the joint-account treatment group, we mainly observe a flat profile around zero income effects. This lack of heterogeneity across the income distributions is a departure with respect to evidence emerging from microcredit interventions which have found that effects on non-farm income-generating activities are concentrated in the upper tail of the distribution (e.g., Banerjee et al. 2015, Angelucci et al. 2015).

Table 9 shows ITT mean effects on yearly food consumption and several other categories of household expenditures. While food consumption is touted as one of the main motives of precautionary savings in poor settings (e.g., Deaton 1990), and represents around 50% of total expenditures in our sample, the magnitude of the mean impacts is close to zero and lacks statistical precision across both treatment groups, as depicted in column 1 of Table 9. Unreported estimates for food expenses in the lean season and the last 90 days before the survey show similar results, meaning these findings are robust to the length of the recalled period. To gain more insights into this important outcome variable, Panel B in Figure 3 shows unconditional ITT quantile treatment effects for food expenditures for both single- and joint-account treatment groups. Imprecisely measured treatment effects emerge across all deciles of food expenditures. However, like the income outcome, heterogeneity in food expenditures distribution is more pronounced among households assigned to the single-account treatment group that shows large negative (positive) impacts in the bottom (top) two deciles of the distribution. For households assigned to the joint-account treatment group, a flat profile emerges around the zero effect.

While impacts on the index of the "family" of expenditures variables are close to zero and lack statistical precision (column 8), there are shifts in the composition of expenses by treatment status. In column 2 in Table 9, we report total expenses on non-labor agricultural inputs including agricultural tools and equipment. Positive mean effects across single-account (27%) and joint-account (53%) treatment groups emerge though these estimates are statistically significant at the 10% level only in the latter case. As expected, no statistically significant differences by saving product design are reported (p-value=0.37). Likewise, column 3 shows positive mean ITT effects on household assets expenses across treatment groups but measured imprecisely. For non-farm household business

expenses (column 4), on the other hand, point estimates are negligible and statistically non-meaningful, which suggests that access to and use of formal saving vehicles by farming households is unrelated to non-farm household business expenditure decisions. Furthermore, interesting results emerge when assessing the size of monetary resources households allocate to loan repayments and land and property taxes: meaningful negative mean effects of 39% and 16% are observed in columns 5 and 6 for households assigned to the joint-account treatment group, both statistically significant at the 5% level. For households assigned to the single account treatment group, the point estimates are halved and lack statistical precision. This is an important result because it suggests that access to formal saving accounts makes households less dependent on debt. However, we cannot rule out an alternative explanation that access to formal deposit accounts makes farming households less willing to pay their dues on time. Finally, household expenses in "temptation" goods (alcohol, tobacco, and chat) and celebrations (religious events and weddings) are assessed in column 7. We observe negligible and imprecisely measured ITT treatment effects. This result does not replicate the findings of important studies on microcredits showing that increases in durable spending by treatment households were essentially offset by reduced spending on "temptation goods" (Banerjee et al. 2015, Crepon et al. 2015).

5.7 Impacts on Subjective Wellbeing

Do quantifiable treatment impacts on savings accumulation translate into farmers' subjective expectations on welfare gains? We address this question by using five subjective measures of financial welfare, each coded as 1 if the household self-reported an increase of "*X*" in the past two years, 0 otherwise. These variables are self-reported only by the head of the household. In column 1 of Table 10, we observe positive and statistically significant ITT impacts on the subjective belief that monetary savings increased in the past two years by 6.6%. These mean effects are statistically equal between households assigned to the single and joint treatment groups. Consistent with impacts on food expenditures reported above, column 2 shows negligible and imprecisely measured impacts on whether food intake increased in the past two years across treatment groups. On the other hand, column 3 reports significant ITT impacts of 8.1% on the subjective belief that household income increased in the past two years, an effect of equal size for households assigned to single and joint account treatment groups. Since we reported no income effects in Table 8, one probable explanation is that the subjective concept of "income" includes a more comprehensive valuation of household wealth and assets that include savings itself. This potential explanation is reinforced by the evidence

in column 4, which depicts statistically significant ITT impacts of the same magnitude (~7%) for the subjective belief that households experienced an overall increase in financial wellbeing in the past two years, a result statistically significant and similar across both treatment groups. Likewise, column 5 shows statistically significant impacts on the belief that households experienced an increase in living standards in the past two years (~5%), a result statistically indistinguishable across single and joint treatment groups (p-value=0.71). Finally, we combine these subjective variables and compute an index of dependent variables in column 6. Results show statistically significant mean effects of 0.12 standard deviations, an effect size of equal magnitude across the saving product design groups. However, the null of no impacts is not rejected when using Anderson's q-adjusted values for multiple hypotheses.

6. Conclusions

In this study, we provided one-time, person-specific small subsidies to cover the pecuniary costs of opening either single or joint formal deposit accounts by farmers in remote areas of Ethiopia. This research showed strong demand in terms of take-up and usage of formal bank deposit accounts among farmers regardless of the saving product design. At the same time, this study highlights the key role of savings product design on intra- and inter-household behavioral responses to ownership of deposit accounts. If the financial inclusion of women is key to tackling Africa's gender inequality, then this intervention shows that bank product design is key for achieving that goal. In settings in which gender stratification of work and social lives is deeply rooted in social norms that work against women, small subsidies that effectively transfer control of bank savings to both spouses might offer a valuable tool for empowering traditionally neglected household members. Indeed, and unlike evidence coming from microcredit interventions implemented in Ethiopia (Tarozzi et al. 2015), India (Banerjee et al. 2015) and Morocco (Crepon et al. 2011), this study shows that access to joint deposit accounts by women is related to sizable and meaningful impacts on women's empowerment.

Moreover, savings product design led to distinctive intra-household labor responses in agricultural households, as sizable and positive farm labor responses in households assigned to joint deposits account emerged, particularly for women and children who showed large labor supply responses. These results support reported findings that women's work in agricultural settings is potentially constrained by gendered inequalities in access to and control of key economic resources (e.g., Doss 2001, Croppenstedt et al. 2013). While there is a legitimate interest in the child labor policy community on the link between household (financial) assets and child labor, this study reported strong heterogeneity by saving product design as child labor systematically increases (decreases) in

households assigned to the joint (single) account treatment group, which ultimately lead to negligible overall child labor impacts for this intervention. Importantly, overall gains in household's farm labor supply are accompanied by reductions in hired farm labor demand which suggests a substitution effect that might cancel out any potential gains in terms of agricultural labor production.

Likewise, saving product design led to systematic differential impacts on schooling outcomes, which is not observed in targeted school-based commitment savings interventions in Uganda (Karlan and Linden 2014a). Significant differential impacts on school attainment emerge for girls relative to boys from households assigned to the joint account group. Consistent with posited channels of intrahousehold bargaining models, one observes that higher autonomy and control of saving resources ultimately lead to meaningful differential resource allocations within the households that better reflect preferences toward female-oriented schooling expenditures. These results are not observed in households with single accounts, which suggests that the architecture of the saving product seems to matter more than the product itself for these outcome variables.

Moving from intra- to inter-household impacts on a large set of household-level outcomes offers a less clear picture of widespread gains in households' welfare as several point estimates lack statistical precision. While we do not find meaningful impacts on agriculture crop production, significant impacts emerge for animal husbandry as the net sales of livestock increased in households assigned to the joint deposits account. This result suggests that livestock, which serves as an insurance substitute in the absence of formal deposit accounts, was used to partially fund formal savings. Moreover, we observe positive but somewhat weak impacts on agricultural investments and practices. Overall, these agriculture-related results suggest that farm production and practices are still an area where male heads of households seem to be mostly in charge, and thus, the role of joint savings accounts seems to be less relevant.

This lack of impact on agricultural crop production is accompanied, as expected, by a lack of income effects. In this regard, this study offers a clear departure with respect to other saving mobilization interventions which have shown remarkable income effects (e.g., Prina 2015, Brune et al. 2016, Callen et al. 2019). Importantly, the lack of income effects coming from measurable outcomes is not mirrored by farmers' subjective beliefs on household improvements in income, finances, and living standards. In fact, results showed positive and statistically significant impacts on subjective welfare gains across both saving product design groups. These results suggest that subjective income and welfare gains might go beyond what standard survey questions can capture. Furthermore, although total expenditures are not affected by formal saving opportunities, this study uncovered shifts in the

composition of expenses towards more agricultural tools and equipment purchases and less toward loan repayments and property/land taxes. In this regard, access to formal savings seems to play a role in helping some households make different intertemporal choices in consumption.

This study is also at odds with voices championing the power of bank deposit accounts as leverage for productive financial loans in agricultural markets. Indeed, our administrative and survey data shows that two years following this intervention the number of bank loans to farmers was the same as it was before the intervention: zero. This result reveals that without an inclusive country-wide regulatory framework that explicitly facilitates the enforcement and monitoring of contractual mechanisms for agricultural markets, interventions like this one will not solve the unavailability of commercial banks loans to farmers.

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Figure 1: Timeline of Financial Intervention

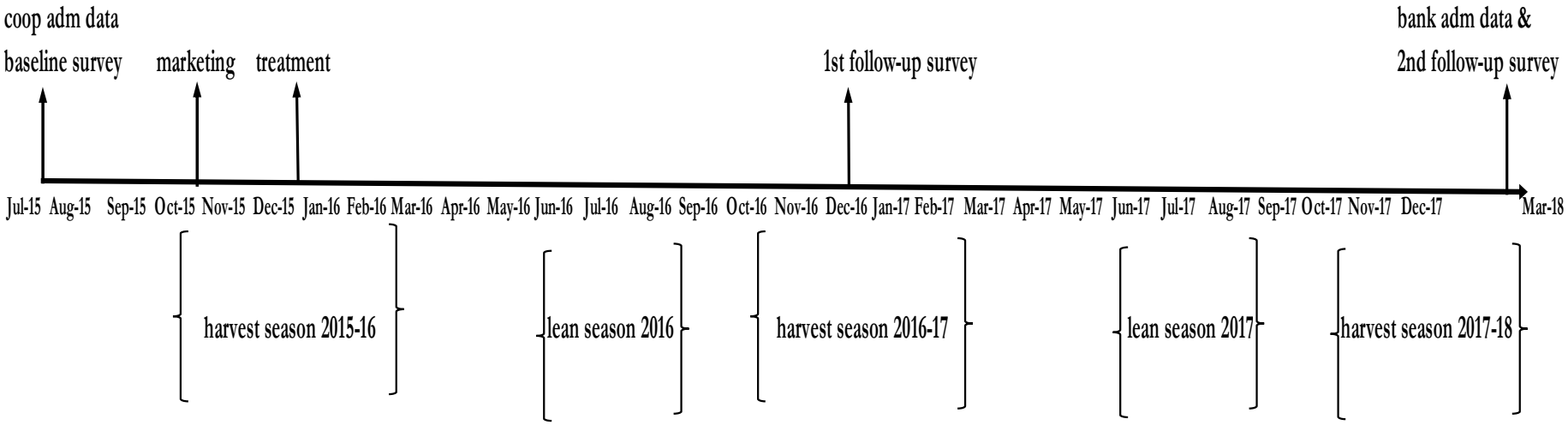


Figure 2: Monthly mean of size of deposits for treated units, Bank Administrative Data

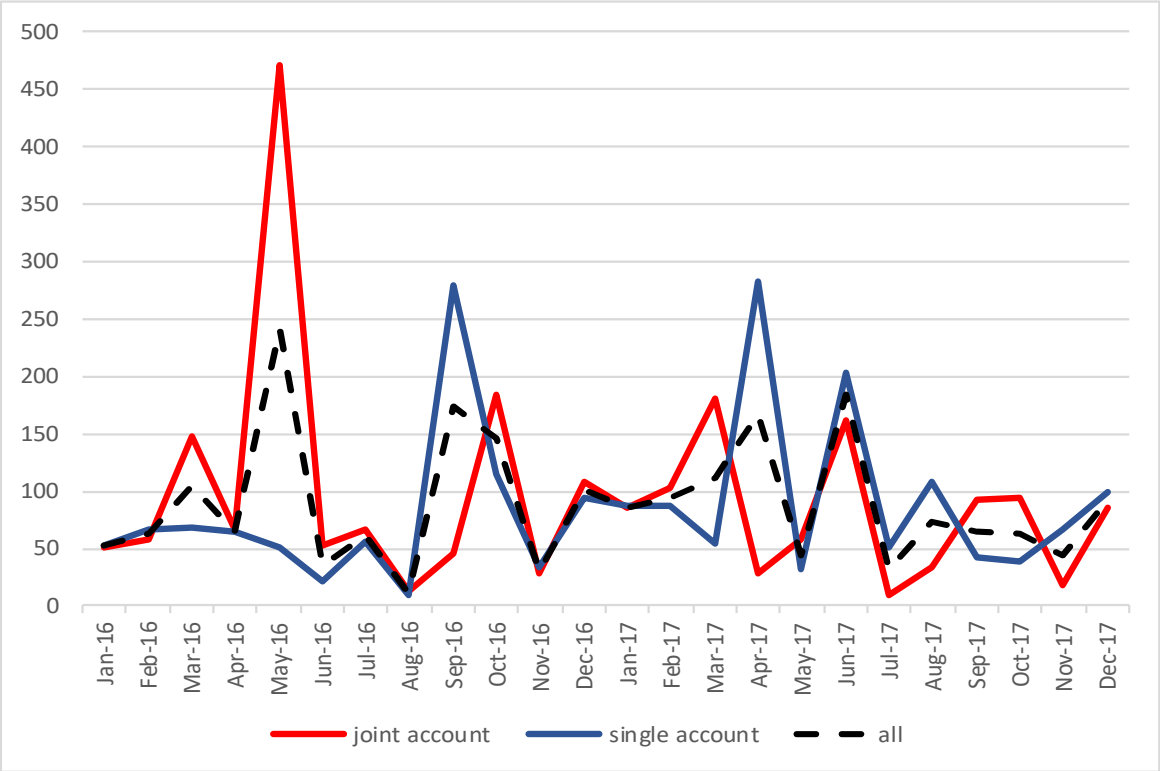
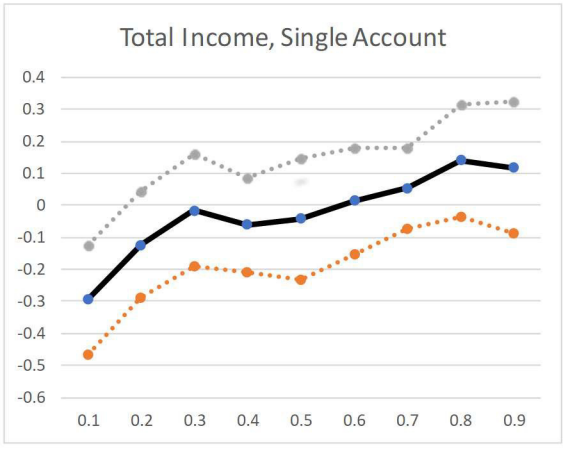
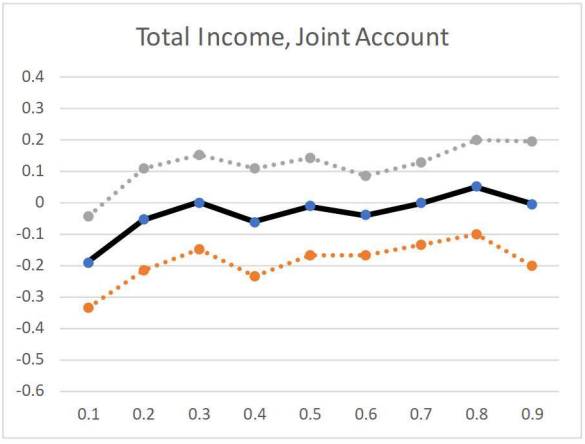
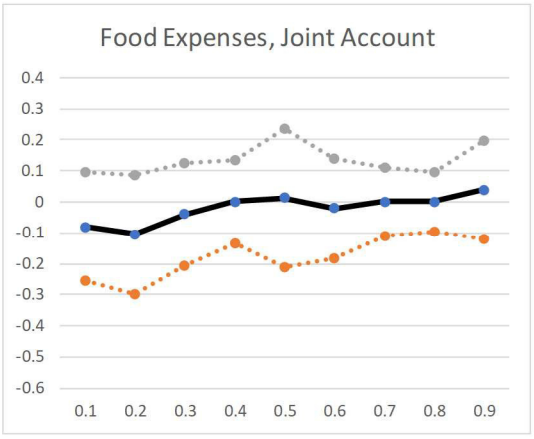


Figure 3: Quantile Treatment Effects, 27 months later





Note: Bootstrap standard errors based on 500 bootstrap repetitions reported in dotted lines . Inverse hyperbolic sine transformation to income outcome.



Note: Bootstrap standard errors based on 500 bootstrap repetitions reported in dotted lines . Inverse hyperbolic sine transformation to food expenses outcome.

Table 1: Take-Up Rates, Administrative Bank Data, December 2015 - January 2018

	Single Account Treatment Group	Joint Account Treatment Group	Control Group
Panel A: Take-Up			
Number of observation in each treatment group	450	450	300
Opened account at partner bank	54%	60%	6%
Open account in initially assigned treatment group	43%	41%	----
Panel B: Usage (unconditional)			
Ever used account (at least one deposit)	51%	56%	5%
Made at least 3 deposits within first 24 months	40%	40%	1%
Active user:made at least 5 deposits within first 24 months	37%	38%	0.30%
Mean saving balance within first 6 months [Birr]	177 (651)	228 (620)	2 (9)
Mean saving balance within first 12 months [Birr]	618 (4266)	526 (4666)	4 (32)
Mean saving balance within first 24 months [Birr]	425 (2297)	387 (2090)	32 (376)
Panel C: Usage (conditional on opening account)			
Mean saving balance within first 6 months [Birr]	308 (888)	413 (702)	35 (21)
Mean saving balance within first 12 months [Birr]	1026 (5410)	980 (6424)	79 (118)
Mean saving balance within first 24 months [Birr]	809 (3159)	597 (2486)	573 (1521)

Notes: Administrative bank data from the partner bank. Standard deviation of monetary saving balances in parenthesis. US$ /Birr exchange rate is around 21 in 2015, 22 in 2016 and 26 in 2017.

Table 2: ITT Impacts on Savings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bank savings			Other savings			Total savings	Index of dependent variables
	has deposit account in any bank	saving deposits in any bank (Birr)	saving balances in any bank (Birr)	under the mattress (Birr)	ROSCAS (Birr)	other (Birr)	bank+ all other (Birr)	
single account	0.287***	637.044**	750.722***	-277.505**	-55.642	-68.614	772.079*	0.133***
	(0.035)	(275.475)	(260.595)	(127.849)	(249.546)	(104.465)	(466.133)	(0.041)
								[adj. q-val=0.007]
joint account	0.318***	335.388	370.058	-216.295*	-66.157	-76.440	375.551	0.125***
	(0.035)	(281.857)	(263.412)	(128.701)	(247.347)	(97.783)	(463.837)	(0.042)
								[adj. q-val=0.013]
p-val: Ho: $T^{single}=T^{joint}$	0.325	0.290	0.156	0.560	0.961	0.924	0.358	0.832
p-val: Joint Significance	0.000	0.069	0.016	0.090	0.962	0.725	0.250	0.002
dep. var. mean in control group	0.360	1087.885	1133.507	1041.301	2285.887	444.951	4634.877	
st. dev.	0.481	3379.823	3127.615	2031.045	3145.808	1470.642	5777.331	
N	1174	1051	1149	1148	1054	1160	1046	991

Notes: Robust standard errors in parenthesis. Regression specification includes strata dummies from the sample stratifying variables. Trimming 2% is applied to all monetary (Birr) variables. The index of dependent variables is computed as a simple average of the z-scores of the dependent variables in columns 1-7 after standardizing each variable by substracting the mean and dividing by the standard deviation in the control group. The exchange rate US$/Birr is around 26 in 2017. Anderson's sharpened False Discovery Rate (FDR) q-values for multiple hypothesis in brackets. *** p<0.01, ** p<0.05, * p<0.10.

Table 3: ITT Impacts on Farm Labor Last 30 days

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
	Pooled		**Men**		**Women**		**Child labor**		**Index of dep. variables**
	participation	hours worked	participation	hours worked	participation	hours worked	participation	hours worked	**for pooled sample**
single account	-0.012	-0.506	-0.032	0.698	0.007	-1.426	-0.045	-0.908	-0.037
	(0.015)	(1.471)	(0.021)	(2.379)	(0.022)	(1.495)	(0.028)	(1.440)	(0.059)
									[adj. q-val=0.593]
joint account	0.045***	2.899**	0.028	1.986	0.056**	3.076**	0.069**	3.712**	0.160***
	(0.015)	(1.460)	(0.020)	(2.302)	(0.022)	(1.550)	(0.028)	(1.488)	(0.058)
									[adj. q-val=0.020]
p-val: Ho: $T^{single}=T^{joint}$	0.000	0.009	0.001	0.535	0.016	0.001	0.000	0.000	0.000
p-val: Joint Significance	0.000	0.021	0.004	0.661	0.014	0.004	0.000	0.001	0.000
dep. var. mean in control group	0.629	35.563	0.732	45.923	0.518	24.450	0.511	17.466	
st. dev.	0.483	43.797	0.443	49.378	0.500	33.529	0.500	24.742	
			Labor participation		**Hours Worked**				
p-val Ho: T(men)=T(women)			0.274		0.812				
p-val Ho: T^{single}(men)=T^{single}(women)			0.208		0.446				
p-val Ho: T^{joint}(men)=T^{joint}(women)			0.360		0.699				
N	5573	5573	2870	2870	2703	2703	1779	1779	5573

Notes: Robust standard error in parenthesis. Farm participation and farm hours do not include household chores activities. The recall time length for these outcome variables refer to the 30 days before the survey date. Regression specification includes strata dummies from the sample stratifying variables. Index of dependent variables are calculated over the pooled sample as a simple average of the z-scores of the dependent variables farm participation and farm hours worked. Anderson's sharpened False Discovery Rate (FDR) q-values for multiple hypothesis in brackets. *** p<0.01, ** , p<0.05, * p<0.10.

Table 4: ITT Impacts on schooling outcomes by gender of the child aged 6-16

	currently attending school		weekly hours of school		years of formal schooling		annual school expenditures (Birr)		Index of dep. variables	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
single account	-0.034	0.002	-0.687	0.254	0.149	-0.013	-0.089	-0.021	-0.054	0.014
	(0.030)	(0.030)	(0.625)	(0.627)	(0.192)	(0.194)	(0.188)	(0.184)	(0.067)	(0.063)
									[adj. q-val=0.593]	[adj. q-val=0.792]
joint account	-0.020	0.052*	-0.664	1.043*	0.257	0.284	-0.003	0.323*	-0.001	0.144**
	(0.028)	(0.029)	(0.595)	(0.599)	(0.184)	(0.200)	(0.176)	(0.176)	(0.062)	(0.060)
									[adj. q-val=0.792]	[adj. q-val=0.048]
p-val: Ho: $T^{single}=T^{joint}$	0.525	0.074	0.968	0.129	0.522	0.088	0.611	0.025	0.385	0.014
p-val: Joint Significance Test	0.606	0.047	0.458	0.143	0.379	0.179	0.851	0.047	0.627	0.014
p-val Ho: T^{single}(boys)=T^{single}(girls)	0.386		0.284		0.551		0.792		0.449	
p-val Ho: T^{joint}(boys)=T^{joint}(girls)	0.074		0.041		0.918		0.186		0.091	
dep. var. mean in control group	0.846	0.821	17.236	16.560	2.823	2.883	4.770	4.761		
std.dev.	0.361	0.383	7.559	7.938	2.392	2.642	2.316	2.448		
N	1073	1093	1071	1091	1077	1104	1075	1102	1052	1079

Notes: Robust standard error in parenthesis. Inverse hyperbolic sine transformation applied to school expenditures (Birr). Regression specification includes strata dummies from the sample stratifying variables. Index of dependent variables are calculated over the boys and girls subsamples separately as a simple average of the z-scores of the four dependent schooling variables after standardizing each variable by substracting the mean and dividing by the standard deviation in the control group. Anderson's sharpened False Discovery Rate (FDR) q-values for multiple hypothesis in brackets.

*** p<0.01, ** p<0.05, * p<0.10.

Table 5: ITT Impacts on Women Empowerment

	Ownership of bank acc	decision-making on bank deposits	decision-making on bank withdrawals	Financial Index	Time Allocation Index	Production Index	Index of Dependent Variables
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
single account	0.162***	0.124***	0.122***	0.119*	0.039	0.048	0.277***
	(0.023)	(0.029)	(0.029)	(0.070)	(0.070)	(0.071)	(0.055)
							[adj. q-val=0.001]
joint account	0.348***	0.255***	0.255***	0.150**	0.085	0.084	0.572***
	(0.026)	(0.030)	(0.030)	(0.066)	(0.068)	(0.068)	(0.056)
							[adj. q-val=0.001]
p-val: Ho: $T^{single}=T^{joint}$	0.000	0.000	0.000	0.591	0.423	0.553	0.000
p-val: Joint Significance	0.000	0.000	0.000	0.072	0.436	0.461	0.000
dep. var. mean in control group	0.058	0.145	0.145	0.000	0.000	0.000	
std. dev.	0.226	0.349	0.349	1.00	1.00	1.00	
N	1146	1146	1146	1113	1109	1112	1108

Note: Robust standard error in parenthesis. Regression specification includes strata dummies from the sample stratifying variables. Empowerment indexes are computed by principal component methods based on decision-making power variables self-reported by women. For the financial index, we included four variables: spending household farm income, spending household non-farm income, managing household savings and soliciting microcredit loans. For the time allocation index, we used five variables: sending children to school, assigning children to hh chores, own farm labor partipation, own labor participation outside the house. For production empowerment index, we include five variables: buying/renting farm tool and equipment, selecting crops, negociating price of coffee, using agriculture inputs, atending FT Coops meetings. Index of dependent variables is calculated as a simple average of the z-scores of the dependent variables included in columns 1-6 after standardizing each variable by substracting the mean and dividing by the standard deviation in the control group. Anderson's sharpened False Discovery Rate (FDR) q-values for multiple hypothesis in brackets. *** p<0.01, ** p<0.05, *p<0.10.

Table 6: ITT Impacts on Agricultural Inputs and Livestock

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	organic fertilizer: manure, compost (kgs/hectare)	**chemical fertilizer (kgs/hectare)**	**new coffee plants (units)**	**seeds (kgs/hectare)**	**whether invested in new tools and equipment**	**Hired labor (units)**	**value of net livestok purchases (Birr)**	**Index of Dependent variables**
single account	0.312**	0.001	10.447**	0.043	0.010	-1.388	-0.417	0.053
	(0.143)	(0.146)	(4.691)	(0.087)	(0.034)	(0.981)	(0.379)	(0.039)
								[adj. q-val=0.295]
joint account	0.262*	0.151	4.014	0.190**	0.022	-0.619	-1.223***	0.032
	(0.142)	(0.145)	(2.923)	(0.089)	(0.035)	(1.002)	(0.379)	(0.033)
								[adj. q-val=0.475]
p-val: Ho: $T^{single} = T^{joint}$	0.722	0.434	0.197	0.070	0.706	0.291	0.016	0.575
p-val: Joint Significance	0.072	0.434	0.054	0.070	0.814	0.306	0.003	0.361
dep. var. mean in control group	4.312	1.192	4.041	0.620	0.315	5.711	0.020	
st. dev.	3.692	1.945	26.099	1.167	0.465	14.457	4.922	
N	1171	1171	1173	1171	1173	1172	1131	1130

Notes: Robust standard error in parenthesis. Regression specification includes strata dummies from the sample stratifying variables. The inverse hyperbolic sine transformation is applied to the following variables: kgs. per hectare of organic fertilizer, chemical fertilizer, seeds, and value of net livestock purchases (Birr). The exchange rate US$/Birr is around 26 in 2017. The index of dependent variables is computed as a simple average of the z-scores of the dependent variables included in columns 1-7. Anderson's sharpened False Discovery Rate (FDR) q-values for multiple hypothesis in brackets.

*** p<0.01, ** , p<0.05, * p<0.10.

Table 7: ITT Impact on Annual Crop Production and Livestock

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	inverse hyperbolic sine transformation of kgs. per hectare							Index of Dependent Variables
	coffee	enset	maiz	avocado	banana	chat	total crop output	
single account	0.150	0.097	-0.328	0.108	-0.141	0 .019	0.039	0.004
	(0.120)	(0.145)	(0.214)	(0.209)	(0.163)	(0.181)	(0.055)	(0.032)
								[adj. q=0.792]
joint account	-0.003	-0.073	-0.104	0.106	-0.118	0.402**	-0.047	0.004
	(0.124)	(0.146)	(0.211)	(0.209)	(0.160)	(0.185)	(0.058)	(0.032)
								[adj. p=0.792]
p-val: Ho: $T^{single} = T^{joint}$	0.134	0.205	0.258	0.987	0.870	0.024	0.130	0.995
p-val: Joint Significance	0.249	0.446	0.28	0.848	0.666	0.037	0.317	0.985
dep. var. mean in control group	7.108	4.030	3.823	3.022	1.483	1.477	8.147	
std. dev.	2.07	3.188	3.038	2.926	2.426	2.373	0.761	
N	1171	1171	1171	1171	1171	1171	1171	1171

Notes: Robust standard errors in parenthesis. Regression specification includes strata dummies from the sample stratifying variables. The inverse hyperbolic sine transformation is applied to all crop variables. Total crop ouput is computed as the sum (in kgs. per hectare) of six different cash crops output: coffee, enset, maiz, avoacado, banana, and chat. The index of dependent variables is computed as a simple average of the z-scores of variables included in columns 1-7. Anderson's sharpened False Discovery Rate (FDR) q-values for multiple hypothesis in brackets. *** p<0.01, ** p<0.05, * p<0.10.

Table 8 : ITT Impacts on Annual Income

	(1) agriculture income (Birr)	(2) non-farm hh business (Birr)	(3) remunerated labor (Birr)	(4) remittances (Birr)	(5) total income	(6) Index of Dependent Variables
	inverse hyperbolic sine transformation					
single account	-0.038	0.138	-0.154	-0.508*	-0.025	-0.041
	(0.065)	(0.320)	(0.300)	(0.280)	(0.057)	(0.035)
						[adj. q=0.361]
joint account	0.025	-0.123	-0.418	-0.313	-0.043	-0.047
	(0.068)	(0.320)	(0.301)	(0.285)	(0.055)	(0.035)
						[adj. q=0.295]
p-val: Ho: $T^{single} = T^{joint}$	0.382	0.363	0.318	0.413	0.729	0.870
p-val: Joint Significance	0.674	0.661	0.347	0.192	0.736	0.369
dep. var. mean in control group	9.940	2.481	2.373	2.187	10.529	
std. dev.	0.884	4.319	4.152	3.956	0.779	
N	1174	1174	1174	1174	1174	1174

Notes: Robust standard errors in parenthesis. Regression specification includes strata dummies from the sample stratifying variables. The inverse hyperbolic sine transformation is applied to all income variables. Total income does not include borrowed money, gob. transfers, and bank withdrawals. The index of dependent variables is computed as a simple average of the z-scores of the dependent variables included in columns 1-5. Anderson's sharpened False Discovery Rate (FDR) q-values for multiple hypothesis in brackets. *** p<0.01, ** p<0.05, * p<0.10.

Table 9: ITT Impacts on Expenditure Categories

	(1) food	(2) farm inputs and tools	(3) household assets	(4) non-farm hh business	(5) loan repayment	(6) land, property taxes	(7) "temptation" goods, celebrations	(8) Index of Dependent Variables
	inverse hyperbolic sine transformation (Birr)							
single account	-0.019	0.243	0.221	0.033	-0.287	-0.083	-0.149	-0.019
	(0.039)	(0.252)	(0.259)	(0.258)	(0.222)	(0.076)	(0.146)	(0.032)
								[adj. q=0.593]
joint account	-0.007	0.437*	0.225	-0.133	-0.506**	-0.169**	0.079	-0.021
	(0.038)	(0.252)	(0.261)	(0.256)	(0.227)	(0.080)	(0.142)	(0.032)
								[adj. q=0.593]
p-val: Ho: $T^{single}=T^{joint}$	0.736	0.379	0.987	0.474	0.266	0.310	0.061	0.937
p-val: Joint Significance	0.878	0.223	0.629	0.755	0.083	0.108	0.171	0.778
dep. var. mean in control group	9.526	3.708	2.250	1.548	1.823	5.497	6.831	
std. dev.	0.697	3.423	3.469	3.551	3.355	0.916	2.004	
N	1174	1174	1174	1174	1174	1174	1174	1174

Notes: Robust standard errors in parenthesis. Regression specification includes strata dummies from the sample stratifying variables. The inverse hyperbolic sine transformation is applied to all expenditure variables. The index of dependent variables is computed as a simple average of the z-scores of dependent variables included in columns 1-7. Anderson's sharpened False Discovery Rate (FDR) q-values for multiple hypothesis in brackets. *** p<0.01, ** p<0.05, * p<0.10.

Table 10: ITT Impacts on Subjective Welfare Gains

	(1)	(2)	(3)	(4)	(5)	(6)
	Relative to two years ago…....					
	increase in hh any monetary savings	**increase in hh food intake**	**increase in hh income**	**increase in overall financial welfare**	**increase in hh living standards**	**Index of Dependent Variables**
single account	0.072**	-0.002	0.082**	0.080**	0.053	0.129**
	(0.034)	(0.035)	(0.034)	(0.033)	(0.034)	(0.067)
						[adj. q=0.124]
joint account	0.054	0.010	0.079**	0.065*	0.041	0.112*
	(0.034)	(0.036)	(0.034)	(0.034)	(0.034)	(0.066)
						[adj. q=0.187]
p-val: Ho: $T^{single}=T^{joint}$	0.564	0.697	0.907	0.622	0.715	0.784
p-val:Joint Significance	0.104	0.92	0.028	0.047	0.280	0.123
dep. var. mean in control group	0.278	0.357	0.264	0.254	0.278	
std. dev	0.448	0.480	0.441	0.436		
N	1173	1173	1173	1173	1173	1173

Notes: Robust standard error in parenthesis. Regression specification includes strata dummies from the sample stratifying variables. Each of the five subjective outcomes are coded as 1 if head of household believes "x" increased relative to 2 years ago, 0 otherwise. The index of dependent variables is computed as a simple average of the z-scores of dependent variables included in columns 1-5. Anderson's sharpened False Discovery Rate (FDR) q-values for multiple hypothesis in brackets.
*** p<0.01, ** p<0.05, * p<0.10.

ONLINE APPENDIX

Using Bank Savings Product Design for Empowering Women and Agricultural Development

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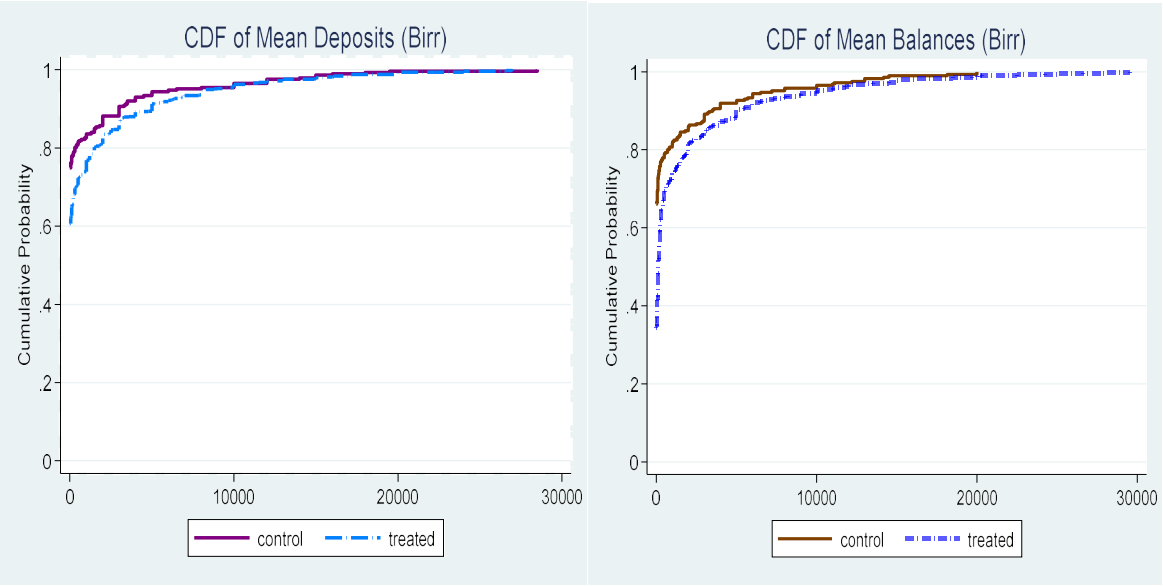
Online Appendix Figure A1: CDF of Mean Deposits and Balances, 27 months later



Online Appendix Table A1: Balancing Test, Baseline Survey Data 2015

	sample mean (std. dev.)		p-value of Ho:	p-value of Ho:	p-value of Ho:
	treatment	control	$T^{single} = T^{control}$	$T^{joint} = T^{control}$	$T^{single} = T^{joint}$
Panel A: Household socio-demographics					
Household size	5.58 (2.06)	5.63 (1.98)	0.71	0.74	0.96
Christian (%)	0.55 (0.49)	0.57 (0.49)	0.82	0.46	0.57
Muslim (%)	0.44 (0.49)	0.42 (0.49)	0.68	0.39	0.61
Ownership of dwelling (%)	0.97 (0.16)	0.96 (0.18)	0.55	0.33	0.68
Access to water from protected well/spring (%)	0.77 (0.41)	0.75 (0.43)	0.45	0.53	0.89
Access to water from unprotected well/spring (%)	0.16 (0.36)	0.19 (0.39)	0.19	0.25	0.87
Main source for lighting is electricity/generator (%)	0.23 (0.42)	0.21 (0.41)	0.78	0.45	0.59
Mud floor (%)	0.71 (0.44)	0.68 (0.46)	0.45	0.30	0.75
Corrugated iron roof (%)	0.76 (0.42)	0.78 (0.40)	0.28	0.76	0.38
Pit latrine ventilated (%)	0.20 (0.40)	0.17 (0.38)	0.06	0.91	0.05
Pit latrine not ventilated (%)	0.77 (0.41)	0.80 (0.39)	0.04	0.67	0.01
Owns a mobile phone (%)	0.66 (0.47)	0.64 (0.48)	0.52	0.59	0.91
Household wealth index	-0.01 (1.79)	0.03 (1.71)	0.86	0.74	0.87
Panel B: Household Finances / savings					
Yearly average total monthly income (Birr)	1228.22 (1315.04)	1361.84 (1877.12)	0.49	0.10	0.25
Yearly average agriculture monthly income (Birr)	820.77 (927.89)	994.95 (1635.45)	0.39	0.00	0.01
monthly income allocated to food (Birr)	596.49 (590.49)	631.28 (1120.97)	0.75	0.42	0.47
monthly income allocated to agric. inputs & equip. (Birr)	56.32 (149.08)	55.45 (138.44)	0.93	0.81	0.72
monthly income allocated to school/education (Birr)	73.85 (145.77)	60.48 (107.98)	0.06	0.52	0.10
monthly income allocated to hired labor (Birr)	92.93 (223.16)	84.25 (163.13)	0.31	0.99	0.25
monthly income allocated to monetary savings (Birr)	78.03 (330.24)	103.69 (424.21)	0.36	0.35	0.93
monthly income allocated to loan repayment (Birr)	16.66 (110.44)	14.35 (96.32)	0.35	0.43	0.07
Houshold received remittances in past year	0.14 (0.34)	0.15 (0.36)	0.61	0.66	0.93
Have bank saving account (%)	0.15 (0.36)	0.15 (0.36)	0.91	0.98	0.88
Walking distance from house to closest bank branch (min)	81.06 (34.75)	79.61 (35.36)	0.50	0.67	0.78
Have savings in microcredits, Coop. Bank, NGOs.	0.13 (.34)	0.14 (0.35)	0.55	0.68	0.83
Save in dried coffee beans	0.56 (0.49)	0.54 (0.49)	0.38	0.87	0.24
Amount of savings in dried coffee beans (kg)	149.58 (183.33)	152.34 (213.86)	0.86	0.81	0.62
Household borrow credit in past 12 months	0.26 (0.44)	0.28 (0.45)	0.64	0.49	0.81
Panel C: Household Agricultural Output/Inputs					
Land size (hectare)	1.07 (1.27)	1.06 (0.78)	0.54	0.48	0.23
Coffe cultivated % total area	0.58 (0.23)	0.57 (0.23)	0.67	0.86	0.78
Production of cherry coffee beans (kg)	488.79 (612.65)	484.25 (496.45)	0.64	0.70	0.37
Production of dried coffee beans (kg)	235.21 (559.47)	225.27 (470.86)	0.63	0.92	0.49
Share of red cherry sold to FT Coop (%)	94.50 (18.89)	94.60 (20.02)	0.90	0.80	0.67
Selling price of cherry coffee beans to FT Coop (Birr)	9.53 (5.61)	9.46 (3.04)	0.80	0.59	0.43
Use of chemical fertilizer (kgs.)	9.97 (36.10)	10.94 (31.26)	0.71	0.68	0.94
Use of organic fertilizer (kgs)	836.61 (1426.02)	896.26 (1428.87)	0.83	0.33	0.47
Number of coffee plants	1503.20 (2740.88)	1460.97 (1938.02)	0.74	0.94	0.73
Units of hired labor in last season	3.78 (6.20)	4.02 (6.03)	0.91	0.32	0.36

CONTINUE….

CONTINUED **Online Appendix Table A1: Balancing Test, Baseline Survey Data 2015**

	sample mean (std. dev.)		p-value of Ho:	p-value of Ho:	p-value of Ho:
	treatment	control	$T^{single} = T^{control}$	$T^{joint} = T^{control}$	$T^{single} = T^{joint}$
Panel D: Heads of Households					
Gender (1=Male)	0.87 (0.33)	0.87 (0.32)	0.61	0.52	0.20
Age	49.82 (14.91)	49.95 (14.97)	0.78	0.95	0.70
Schooling	3.69 (3.63)	3.54 (3.42)	0.60	0.53	0.92
Ever attended formal school (%)	0.65 (0.47)	0.65 (0.47)	0.82	0.97	0.83
Marital status (1=married)	0.84 (0.36)	0.85 (0.35)	0.96	0.28	0.21
Hours worked in household farm last month	79.67 (53.59)	84.43 (55.07)	0.11	0.44	0.36
Hours worked in non-farm household business last month	8.17 (25.61)	6.40 (21.75)	0.31	0.35	0.93
Panel E: Children Schooling and Labor					
Farm work for children aged 6-14 last month (%)	0.44 (0.49)	0.47 (0.49)	0.25	0.39	0.74
Farm monthly hours worked for children aged 6-14	16.06 (28.14)	16.97 (26.88)	0.31	0.89	0.35
Children aged 6-14 attending school (%)	0.80 (0.40)	0.82 (0.38)	0.26	0.39	0.74
Average years of schooling for children aged 6-14	2.52 (2.18)	2.36 (2.11)	0.26	0.16	0.79
Panel F: Women Labor Supply					
Farm work for women older than 14 (%)	0.66 (0.47)	0.66 (0.47)	0.85	0.97	0.79
Farm monthly hours worked for women older than 14	30.27 (33.65)	32.40 (35.26)	0.13	0.53	0.32
Household variables: F-test of joint significance (p-val)			0.63	0.87	0.63

Note: Sample mean values. Standard deviation in parenthesis. 449, 450, 299 households in the single account treatment group, joint account treatment group, and control group, respectively.

Online Appendix Table A2: Determinants of take-up saving accounts, Household Survey

		Multinomial Model	
	Take-up	**Single Account**	**Joint Account**
Household size	0.013	1.004	1.172***
Christian	0.100*	1.355	1.979***
HH Gender (1=Male)	-0.054	0.633	2.692
HH Age 30-45	0.039	1.323	0.957
HH Age 46-65	0.113*	1.602	1.628
HH Age 65+	0.017	1.038	1.069
HH Literacy	0.119***	1.602**	1.891**
HH Lives with spouse	0.079	1.056	2.503***
Coffe cultivated % total area	-0.113	0.554	0.697
Total production of coffee crop (kg)	0.000	1.000	0.999
Household wealth index	-0.010	0.905*	0.995
Has non-farm household business	-0.122**	0.432***	0.715
Yearly average total monthly income ($Birr)	0.000	1.000	1.000
Share of annual income spend in food	0.076	1.373	1.562
Share of annual income spend in school expenses	0.394*	15.908**	1.632
Amount of remitances received ($Birr)	0.000**	1.000	1.000**
Have bank saving account	-0.118**	0.608*	0.578*
Save in dried coffee beans	0.041	1.203	1.237
Lend money to relatives and neighbors	0.100**	1.673**	1.572
Hyperbolic time preferences	-0.077*	0.799	0.535**
Have shortage of food	0.031	1.291	0.904
Could not afforded eat balanced meals	-0.003	1.213	0.722
Cut size of meals or skip meals	0.010	0.770	1.666
Experience hanger due to lack of money	0.001	1.082	0.843
Social Capital Index (Trust)	0.033***	1.184	1.181**
Fairtrade Relational Index	0.014	0.958	1.244*
Distance house to closest bank branch (GIS)	0.001	0.955	1.079**
Number of adverse transitory shocks	-0.051	0.746***	0.880
Shock: illness/death of family member	0.053	1.490*	0.981
Shock: drought / flood	0.030	1.182	1.165
Shock: loss of livestock	0.088	1.726*	1.240
Shock: crop loss/ crop disease	0.053	1.300	1.209
Personal trait (optimistic)	0.136***	1.365	2.950***
Personal trait (risk adverse)	-0.058	0.776	0.692*
R^2	0.12	0.13	0.13
N	878	878	878

Notes: Independent variables collected in 2015 baseline household survey. Dependent variables are based on administrative data. Reported multinomial coefficients are the relative-risk ratios. *** p<0.01, ** p<0.05, *p<0.10.

Online Appendix Table A3: Description of Outcome Variables Any

Any Bank Savings	Description
'Own bank account'	1=if head of household and/or spouse owned a commercial bank deposit account in the past 12 months prior to survey, 0=otherwise
'Size of saving deposits ($)'	Monetary value (in Birr $) of saving deposits made in the past 12 months prior to survey for the head of household and/or spouse
'Size of saving balances ($)'	Monetary value (in Birr $) of saving balances at the time of survey held in the saving account own by head of household and/or spouse
Other monetary saving channels	
save under the mattress	1=if head of household and/or spouse held montary savings at home in the past 12 months prior to survey, 0=otherwise
save in ROSCAs (Iqqub, Iddir)	1=if head of household and/or spouse held montary savings at Iqqub/Iddir in the past 12 months prior to survey, 0=otherwise
save in other institutions	1=if head of household and/or spouse held montary savings in other institutions (Coffee Copps microfinance institutions, Clubs/Associations, NGOs, Other) in the past 12 months prior to survey, 0=otherwise
saving balances under the mattress	Monetary value (in Birr $) of saving balances at the time of survey held at home by head of household and/or spouse.
saving balances in ROSCAs (Iqqub, Iddir)	Monetary value (in Birr $) of saving balances at the time of survey held at Iqqub/Iddir by head of household and/or spouse.
saving balances in other institutions	Monetary value (in Birr $) of saving balances at the time of survey held at other institutions by head of household and/or spouse.
total savings	Monetary value (in Birr $) of bank plus non-bank saving balances at the time of survey by head of household and/or spouse.
Labor	
farm labor (extensive)	1=whether individual aged 6-65 worked in the household farm in the past 30 days prior to the survey, 0=otherwise.
all labor: farm+non-farm (extensive)	1=whether individual aged 6-65 worked in the household farm and/or in any other paid or unpaid farm or non-farm activities inside or outside the house in the past 30 days prior to the survey, 0=otherwise.
farm labor (intensive)	Number of worked hours in the household farm in the past 30 days prior of the survey
all labor: farm+non-farm (intensive)	Number of worked hours in the household farm and/or in any other paid or unpaid farm or non-farm activities inside or outside the house in the past 30 days prior to the survey
Schooling	
currently attending school	1=whether individual aged 6-16 is currently attending formal school institution at the time of survey, 0=otherwise.
weekly hours of school	Number of average hours per week day individual aged 6-16 currently attend formal school at the time of survey
years of formal schooling	Number of completed years of formal schooling for individual aged 6-16 at the time of survey
school expenditures	School related expenditures (Birr $) in the past 12 months prior to survey for individual aged 6-16.
Women Empowerment	
Ownsership of bank deposit account	1=if woman head of household or spouse, owned a single or joint bank deposit account in the last 12 months prior to survey, 0=otherwise.
Decision-making on bank acc deposits	1=if woman head of household or spouse is typically the main decider or equal decider with respect to her male husband in terms of bank saving deposits, 0=otherwise
Decision making on bank acc withdawals	1=if woman head of household or spouse is typically the main decider or equal decider with respect to her male husband in terms of bank saving withdrawals, 0=otherwise
Financial empowerment index	PCA index is computed based on four intermediate outcomes: woman' decision-making power on the allocation of agricultural revenues in the past 12 months, woman' decision-making power on the allocation of non-agricultural revenues in the past 12 months, woman' decision-making power on the management of any monetary savings, woman' decision-making power on the solicitation of any monetary loans. Each one of these 4 variables are coded as: 2=if woman head of

	household or spouse is the only decision maker or the most important decision maker, 1=if woman head of household or spouse equally shares the decision along with her male head of household or spouse, and 0=otherwise.
Time allocation empowerment index	PCA index is computed based on five intermediate outcomes: woman' decision-making power on sending children to school in the past 12 months, woman' decision-making power on assigning children to household chores in the past 12 months, woman' decision-making power on assigning children to farm work, woman' decision-making power to work at the household farm in the past 12 months, woman' decision-making power to work in farm or non-farm activities outside the house in the past 12 months. Each one of these 5 variables are coded as: 2=if woman head of household or spouse is the only decision maker or the most important decision maker, 1=if woman head of household or spouse equally shares the decision along with her male head of household or spouse, and 0=otherwise.
Production empowerment index	PCA index is computed based on five intermediate outcomes: woman' decision-making power on buying/renting farm tool/equipment in the past 12 months, woman' decision-making power on selecting crops in the past 12 months, woman' decision-making power on using agricultural inputs such as fertilizer and pesticides in the past 12 months, woman' decision-making power on negotiating the price of coffee crops in the past 12 months. Woman' decision-making power on attending Fairtrade cooperative meetings in the past 12 months Each one of these 5 variables are coded as: 2=if woman head of household or spouse is the only decision maker or the most important decision maker, 1=if woman head of household or spouse equally shares the decision along with her male head of household or spouse, and 0=otherwise.
Agriculture Output	
Coffee	Number of kilograms per hectare of total coffee produced in the past agricultural season (March 2017-February 2018). It includes red cherry coffe and dried coffee.
Enset	Number of kilograms per hectare of enset produced in the past agricultural season (March 2017-February 2018)
Maiz	Number of kilograms per hectare of maiz produced in the past agricultural season (March 2017-February 2018)
Banana	Number of kilograms per hectare of banana produced in the past agricultural season (March 2017-February 2018)
Chat	Number of kilograms per hectare of chat produced in the past agricultural season (March 2017-February 2018)
Avocado	Number of kilograms per hectare of avocado produced in the past agricultural season (March 2017-February 2018)
Agriculture Inputs/Practices	
Organic fertilizer	Kilograms per hectare of manure and compost applied to household plots in last agricultural season (March 2017-February 2018)
Chemical fertilizer	Kilograms per hectare of chemical fertilzier applied to household plots in last agricultural season (March 2017-February 2018)
New coffee plants	Number of new coffee trees purchased in last agricultural season (March 2017-February 2018)
Seeds	Kilograms per hectare of seeds applied to household plots in last agricultural season (March 2017-February 2018)
New tools and equipment	1=whether household purchase any new tool or equipment used in agricultural production in the last agricultural season (March 2017-February 2018), 0=Otherwise.
Hired labor off harvest	Number of effective workers (workers times days) hired for wage work in the household farm in the harvesting time in the last agricultural season (March 2017-February 2018)
	Number of effective workers (workers times days) hired for wage work in the household farm offside the harvesting time in the last agricultural season (March 2017-February 2018)
Value of livestock net purchases	Value of livestock purchases minus value of livestock sells (in Birr $). Livestok includes cows, oxen, other cattle, horses/mules, donkeys, camels, sheep, goats, chicken.
Income	
Agriculture crops	Household annual income (Birr $) from agricultural crops (last 12 months prior to survey)
Non-farm household business	Household annual income (Birr $) from non-farm household business sales (last 12 months prior to survey)
Remunerated labor	Household annual income (Birr $) from remunerated labor (last 12 months prior to survey)
Remittances	Houshold annual income (Birr $) from remittances (last 12 months prior to survey)

Total income	Household annual total income (Birr $) from all income sources after excluding goverment transfers, borrowed income and bank withdrawals (last 12 months prior to survey)
Expenditures	
Food	Household annual expenditures (Birr $) in food consumption (last 12 months prior to survey)
Farm inputs/tools/equipment	Household annual expenditures (Birr $) in farm related inputs/tools/equipment (last 12 months prior to survey)
Household assets	Household annual expenditures (Birr $) in household assets such as radio, tv, cellphones, e;ectrical oven, etc. (last 12 months prior to survey)
Non-farm household business	Household annual expenditures (Birr $) in non-farm household business inputs and equipment (last 12 months prior to survey)
Loan repayment	Household annual expenditures (Birr $) in loan repayments (last 12 months prior to survey)
Land and other property taxes	Household annual expenditures (Birr $) in land and property taxes (last 12 months prior to survey)
"temptation goods'/ celebrations	Household annual expenditures (Birr $) in temptation goods (alcohol, tobacco, suret, gaya) and social/religious festivities/celebrations (last 12 months prior to survey)
All expenditures	Household annual total expenditures (Birr $) (last 12 months prior to survey)
Subjective welfare gains	
Increase in hh monetary savings	1=if relative to two years ago your current household monetary savings increase, 0=otherwise
Increase in hh food intake	1=if relative to two years ago your current household food intake increase, 0=otherwise
Increase in hh income	1=if relative to two years ago your current household income increase, 0=otherwise
Increase in hh overall finances welfare	1=if relative to two years ago your current household overall financial situation increase, 0=otherwise
Increase in hh overall living standards	1=if relative to two years ago your current household standards of living increase, 0=otherwise

Online Appendix Table A4: ITT Impacts on Savings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bank Savings			Other Savings			Total savings	Index of
	has deposit account in any bank	saving deposits in any bank (Birr)	saving balances in any bank (Birr)	under the mattress (Birr)	ROSCAS (Birr)	Other (Birr)	bank+ all other (Birr)	Dependent Variables
		inverse hyperbolic sine transformation						
single account group	0.287***	1.134***	1.947***	-0.819***	-0.011	0.129	0.525**	0.258***
	(0.035)	(0.293)	(0.290)	(0.269)	(0.324)	(0.226)	(0.240)	(0.065)
joint account group	0.318***	1.005***	1.957***	-0.321	0.290	0.000	0.576**	0.297***
	(0.035)	(0.291)	(0.286)	(0.272)	(0.319)	(0.225)	(0.234)	(0.064)
p-val: Ho: $T^{single}=T^{joint}$	0.325	0.641	0.967	0.036	0.283	0.530	0.779	0.459
p-val: Joint Significance	0.000	0.000	0.000	0.006	0.495	0.780	0.040	0.000
mean of control group	0.360	2.203	2.802	3.022	5.509	1.513	7.486	
std. dev.	0.481	3.800	3.967	3.826	4.084	3.164	3.369	
N	1174	1174	1172	1171	1071	1170	1067	1067

Notes: Robust standard errors in parenthesis. Regression specification includes strata dummies from the sample stratifying variables. The inverse hyperbolic sine transformation is applied to all continuous (Birr) variables. The index of variables is computed as a simple average of the z-scores of the dependent variables in columns 1-7 after standardizing each variable by substracting the mean and dividing by the standard deviation in the control group. The exchange rate US$/Birr is around 26 in 2017. Anderson's sharpened False Discovery Rate (FDR) q-values for multiple hypothesis in brackets. *** p<0.01, ** p<0.05, * p<0.10.

Online Appendix Table A5: In-person bank branch visit by women

single account	0.266***
	(0.089)
joint account	0.452***
	(0.092)
p-val: Ho: $T^{single}=T^{joint}$	0.056
p-val: Joint Significance	0.000
dep. var. mean in control group	0.000
std. dev	1.000
N	1112

Notes: Robust standard errors in parentheses. Regression specification includes strata dummies from the sample stratifying variables. Dependent variable is a categorical variable that equals "2" if she typically visited the bank alone, "1" if she typically visited the bank accompanied, and "0" if no visit happened. We standardized this variable by substracting the mean in the control group and dividing by the standard deviation in the control group. *** p<0.01, ** p<0.05, * p<0.10.

Online Appendix Table A6: ITT Impacts on Farm + Non-Farm Labor Last 30 days

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Pooled		Men		Women		Child labor	
	participation	hours worked	participation	hours worked	participation	hours worked	participation	hours worked
single account	-0.008	0.248	-0.023	3.412	0.004	-2.728	-0.038	-0.561
	(0.015)	(1.938)	(0.018)	(3.148)	(0.022)	(1.822)	(0.029)	(1.489)
joint account	0.042***	1.622	0.029	0.290	0.048**	2.213	0.080***	4.544***
	(0.015)	(1.907)	(0.019)	(3.004)	(0.022)	(1.927)	(0.028)	(1.541)
p-val: Ho: $T^{single}=T^{joint}$	0.000	0.416	0.002	0.211	0.031	0.002	0.000	0.000
p-val: Joint Significance	0.000	0.615	0.009	0.393	0.038	0.009	0.000	0.000
dep. var. mean in control group	0.667	46.009	0.772	61.067	0.553	29.808	0.511	17.786
st. dev.	0.471	57.532	0.419	66.058	0.497	40.914	0.500	25.096
N	5573	5570	2870	2870	2702	2700	1779	1779

Notes: Robust standard error in parenthesis. Labor measures include farm+ non-farm participation and hours worked. It does do not include household chores activities. The recall time length for these outcome variables refer to the 30 days before the survey date. Regression specification includes strata dummies from the sample stratifying variables. *** p<0.01, ** , p<0.05, * p<0.10.

Online Appendix Table A7: ITT Impacts on Women's Farm Labor Participation by Work Status at Baseline

	Work at baseline	No work at baseline
single account	-0.003	0.012
	(0.029)	(0.036)
joint account	0.021	0.102***
	(0.029)	(0.036)
p-val: Ho: $T^{single}=T^{joint}$	0.352	0.005
p-val: Joint Significance	0.606	0.004
p-val Ho: T^{single}(work)=T^{single}(no work)	0.740	
p-val Ho: T^{joint}(work)=T^{joint}(no work)	0.076	
dep. var. mean in control group	0.601	0.397
st. dev.	0.490	0.490
N	1666	1037

Notes: Robust standard error in parenthesis. Farm labor participation does not include household chores activities. The recall time length for the outcome variable refer to the 30 days before the survey date. Regression specification includes strata dummies from the sample stratifying variables. *** p<0.01, ** , p<0.05, * p<0.10

Online Appendix Table A8: ITT Impacts on Women Empowerment, Sub-components Analysis , 27 months later

	Financial Empowerment Index			Time Allocation Empowerment Index					Production Empowerment Index				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	spending hh farm income	spending hh non-farm income	managing hh savings	children' school	children' work	children' hh chores	farm work	work outside	buying and renting agr. tools	selecting crops	negociating coffee price	using agr. inputs	attending Coop meetings
single account	0.120*	0.152**	0.057	-0.039	0.005	0.083	0.076	0.080	0.098	0.014	0.034	0.027	0.062
	(0.070)	(0.070)	(0.073)	(0.076)	(0.073)	(0.076)	(0.071)	(0.074)	(0.072)	(0.074)	(0.072)	(0.072)	(0.069)
joint account	0.121*	0.190***	0.077	0.045	0.085	0.010	0.068	0.120*	0.106	0.027	0.088	0.077	0.066
	(0.066)	(0.065)	(0.070)	(0.072)	(0.070)	(0.073)	(0.068)	(0.070)	(0.070)	(0.071)	(0.070)	(0.069)	(0.066)
p-val: Ho: $T^{single}=T^{joint}$	0.987	0.505	0.741	0.177	0.179	0.264	0.881	0.535	0.899	0.834	0.389	0.413	0.939
p-val: Joint Significance	0.151	0.014	0.549	0.399	0.302	0.437	0.514	0.235	0.281	0.925	0.420	0.491	0.571
dep.var. mean in control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
st. dev	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N	1112	1112	1112	1109	1109	1110	1112	1112	1112	1112	1112	1112	1111

Notes: Robust standard errors in parenthesis. Each sub-component of women empowerment indices was standardized relative to the mean of the control group for ease of interpretation. Full description of variables given in Appendix Table A3. *** p<0.01, ** p<0.05, *p<0.10.