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2 Executive summary

Introduction

Finance is considered a major barrier to smallholder participation in most agricultural value chains. Many farmers in developing countries lack access to formal financial services, and as such must either provide self-finance or take informal loans for any agricultural inputs they use. Increasing the proportion of smallholders with access to finance could increase adoption of high value crops and growing practices that can help farmers maintain or increase crop quality along several dimensions. With improvements both the quantity and quality of production within value chains for high-value crops, farmer incomes could grow.

However, well-known constraints hinder smallholder farmers from obtaining finance from formal sources (banks and microfinance institutions), and from informal sources to provide credit to smallholder farmers. Farmers face idiosyncratic risks related to agriculture that are unfamiliar to banks, and they have knowledge about how and when their products can be delivered to markets that banks may not know. Meanwhile, farmers are spatially disperse, increasing the transaction costs to banks in making loans to farmers.

A potential solution to some of these challenges is agricultural value chain finance (AVCF). A standard AVCF scheme allows a formal lender (e.g. a bank) to lend to a single enterprise (e.g. a processor), which then buys crops from individual farmers. The relationship between the enterprise and farmers can act as a substitute for more formal collateral provided by the farmers. The enterprise can more effectively monitor and screen farmer and provide the individualized loans that banks find too costly to make, while the bank retains the ability to make a formal loan to an enterprise with a business easier to understand for its loan officers.

Objectives

This project worked in Indonesia, Myanmar, and Vietnam to increase knowledge about how to implement innovative and inclusive agricultural value chain financing models. It had four specific objectives:

1. Increase understanding about the context and potential for agricultural value chain financing models and approaches;
2. Develop a rigorous impact evaluation design for agricultural value chain financing models that will be implemented by partners;
3. Increase knowledge about how to design and implement innovative and inclusive agricultural value chain financing models in target countries;
4. Enhance awareness and adoption of agricultural value chain financing models.

Research Methods

The project took place in two phases, with different methodologies put in place for each phase. In the first phase, the research team in each country developed a policy report, that described the constraints and opportunities for AVCF in each of the three countries. The reports maintained a common structure across the three countries. Each report explored the way that country specific policies related to both agriculture and finance would shape the opportunities for AVCF, considering agricultural production patterns, financial rules, regulations, and available government programs to extend lending, and available technologies to implement products that could potentially reduce transaction costs.

The second phase meant to implement relatively large-scale pilot projects in each of the three countries, using randomized control trials (RCTs) to evaluate the pilot projects. It was implemented in very different ways in the three countries. In Indonesia, the national research team strongly preferred to implement smaller pilot projects, with the idea that the team could find one that would scale up to large enough for an RCT. As a result, three small pilots were conducted as part of the second phase in Indonesia. The team also conducted a survey on

the relationship between gender, farm-based decision making, and finance based decision making, to learn more about how to design interventions for women specifically in the future. In Myanmar, the coup in 2021 changed the way the project could work there somewhat permanently. As a result, the project completed analysis of a small pilot project that took place during the first phase with BRAC, and conducted some further data analysis on the relationship between conflict and access to finance. Therefore, the only country in which we fielded a pilot with an RCT was in Vietnam. There, the project worked with Lien Viet Post Bank to offer loans to coffee farmers that were tailored to the coffee growing season; those loans were offered alongside the Phuc Sinh coffee company, which exports its coffee under the Rainforest Alliance standard, so all farmers in the trial needed to meet the standard.

Major Findings

To summarize the findings from the country reports in the first phase, the project published a composite paper detailing lessons that appeared similar to all three countries (de Brauw, 2021). The paper finds that to build a successful AVCF model, AVCF requires improvements to existing credit constraints, a relatively large amount of value to be created above the status quo, the ability of lenders to understand, assess and viably price substantial production or marketing risks that no single actor would like to face, and appropriately designed lending products for traders or processors that support on-lending to farmers. These features are all present in some value chains in all three IFS4Ag countries; perhaps these conditions are present in more value chains in Myanmar than in Viet Nam or Indonesia, as the yield gap there is larger. Still, each of these economies also share institutional characteristics that can foster AVCF. In Myanmar and Viet Nam, property rights over land are incomplete, which rules out vertical integration. In Indonesia, the complex role of the state in the economy makes AVCF feasible particularly for agricultural products that are less amenable to plantations.

A second important finding, which has since been corroborated by some of the second phase results, is that technology is not a magic bullet that will help fill the credit gap. Though there are plenty of potential uses of technology that can help agricultural value chains work more efficiently, studies have also shown that technology is not a magic bullet. Technologies must be designed well for their purposes; in other words, apps should be designed intuitively and/or with an appropriate literacy level in mind. Whereas the world is now awash with mobile phones, fast internet access is necessary for farmers to be able to access videos, and reliable access is necessary for farmers to observe market prices or access other farming information. That said, ICTs have serious potential to help lower agricultural extension costs, crop monitoring, speed up payments, connect buyers to sellers, and improve traceability.

In the second phase in Indonesia, we conducted three pilots—one with a rice processor, one with a shallot seed producer, and one with a vegetable cooperative. The research team then fielded a survey on gender, finance, and agricultural practices with a larger sample, to better understand how policy can be changed to better support women in agriculture. All the pilots were relatively small, and those offered loans were not randomly selected, so we largely report descriptive results. The first pilot, with rice producers, was successful in terms of raising their input expenditures and their revenues, though the latter result is not quite statistically significant. However, there were challenges getting farmers to pay back loans; hence, it was decided not to scale up this trial. The second and third pilots gave partial credit to assist with input expenditures in growing shallots and vegetables, respectively. Input expenditures did not appear to be higher, on average, among treated farmers relative to those who did not receive the partial credit. We found the shallot farmers paid back the loans without a problem, while vegetable farmers did not, due in part to lower than expected prices.

The survey on gender, finance, and agricultural practices lead to a number of different insights about future policy design. First, we find that women are quite involved in agricultural finance decisions, though there is some heterogeneity across provinces. In some provinces, such as North Sumatra, agricultural finance messages should probably be tailored to women, given their substantial role in decision making. We also find heterogeneity in women's participation in agriculture by task; controlling for province, women are less likely to do pre-planting tasks

and to spread pesticides, but are more likely to plant relative to the highlands. In North Sumatra, women are more likely in general to conduct agricultural tasks, while in West Java they are more likely to plant and weed, but less likely to spread pesticides. These findings can again help the government consider how to target interventions on improving agricultural practices.

In Myanmar, we analysed a pilot in which maize farmers were split into two groups—one that was offered loans through an automated scoring mechanism, and a second group which was offered loans through traditional channels. The analysis does not find evidence that the automated scoring mechanism reflects the risk of default; it did not predict default well. It seems likely that improved automated scoring mechanisms are needed. This analysis then finds that loans had muted impacts on input use and no impacts on agricultural output relative to the control group. This finding may either reflect that this pilot was small and therefore has low statistical power. However, the fact that we do not observe differences in input use between loan recipients and the control group suggests that farmers could find other sources of money to purchase required inputs.

In Vietnam, we do not find evidence that the loans offered as part of the project caused households to do better than a subset of the baseline control group that had similar observable characteristics. However, the “treatment” households were clearly in need of loans, given that the control group did not have many loans at all. The qualitative work suggests the loan products were not as flexible as loans available from the Agricultural Bank of Vietnam and carried a higher interest rate. The interest rate issue was partially bad luck—project loans were offered with market rates, and that specific time was a particularly bad time in terms of market interest rates. However, improved loan design, such as repayment flexibility, might have somewhat improved demand. However, other factors, such as concerns about future financial access and risk aversion, also led to lower loan demand.

There are important lessons for AVCF in Vietnam. Beyond the apex buyer issue described below, it would seem important to workshop the products more extensively with the lending market; while the products were tailored to coffee production, they lacked some of the repayment flexibility offered by other lenders that is valued by borrowers. A much clearer use case for AVCF is in helping the transition between old and new tree stock for crops such as coffee (e.g. Bronkhorst et al., 2017). Unfortunately, in this specific case though better breeds of *arabica* are available for Son La (a province in the North West of Vietnam), in neither our focus groups nor the Key Informant Interviews (KIIs) did respondents consider the need for financing a transition from old to new tree stock. Moreover, respondents in both focus groups and KIIs brought up a desire for person-to-person service, due presumably to trust issues with technology. Unfortunately, person-to-person interactions also lead to much higher transaction costs than newer mobile banking products which could help facilitate less expensive loan products.

Lessons about AVCF

By combining the varied lessons from these three countries, the project has provided several lessons about attempting to increase access to finance among smallholders and other marginalized value chain actors in Southeast Asia. While the pilots conducted by the project had varying success, they all provide lessons about designing better AVCF products in the future, which could be important for meeting policy goals. Some of the most important lessons include:

First, we find that while technology may be useful in reducing transaction costs in an AVC, but it is important to understand its limitations. The new technologies embodied in either feature phones or smart phones, satellite data, and even weather stations can theoretically help reduce transaction costs, but the implementation must be tailored to the context. In Myanmar, for instance, the automated credit scoring method tested in our pilotingdid not appear to predict default at all. In Vietnam, our research indicates that farmers prefer face-to-face interactions were preferable for marketing loan products.

Second, while farmers may seem to be missing economic opportunities due to a lack of available credit, it does not automatically mean that farmers or other value chain actors will automatically demand finance. Financial products must be attractive on several dimensions, including interest rates, payment terms, and familiarity with those offering them, to ensure that demand follows. This point fits findings from both Indonesia and Vietnam, albeit in different ways. In Indonesia, the research team had to approach a large number of collectives to find groups interested in and appropriate for pilot trials. In Vietnam, though financial products were explicitly designed for the coffee value chain, there was still little demand among farmers for them.

Third, our project demonstrates that links between financial institutions and off-takers need to be strong to make AVCF work, and off-takers need to be dominant buyers in the area. Though in Vietnam the Phuc Sinh coffee company had linkages to farmers in all groups, since other companies could out-bid them for coffee the linkage between farmers and Phuc Sinh was a bit tenuous. Moreover, the business position of the off taker must also be strong, as the PT MDP example shows in Indonesia.

Fourth, agriculture and finance policy are both important in shaping the opportunities for AVCF, but engaging with agri-food companies to understand their needs can help find opportunities for AVCF in the future. These companies could come either on the input side, if specific inputs could boost productivity, or the collecting and processing side, where more quality product can allow such companies to use their capital more efficiently.

Suggested Future Research

The learning from this project can be used to design future around AVCF; we believe it would be most effective in countries with similar development levels (Low-Middle Income countries). In countries other than Indonesia and Vietnam, it would be important to first understand financial regulations as they pertain to agriculture in those countries, since they are important in shaping potential AVCF schemes.

Within Vietnam and Indonesia, the project results and policy engagement have led us to consider potential opportunities. First, in Vietnam, AVCF could play an important role in the large, planned expansion of the Vietnam Sustainable Agriculture Transformation Project, which helped reduce emissions from rice production among participating areas. An AVCF scheme could help either collectives or farmers make required investments to reduce water use, and eligibility for carbon credits could be used as an incentive to induce additional demand. As emissions reduction is a key governmental goal, research on how to best implement such an AVCF scheme would be immediately policy relevant. In Indonesia, it could be possible to adjust the type of KUR loans available to help make them more amenable to increasing agricultural production (e.g. Gunawan et al., 2021). The size of agricultural KUR loans, for example, could be increased if farmers have records of existing relationships with off-takers. Off-takers could potentially be engaged to assist with blocks of KUR loans. Future projects could help develop criteria that banks could use to find quality off-takers, using the learning from this project.

3 Background

Finance is considered a major barrier to smallholder participation in value chains for high value crops and animal by-products. Many farmers in developing countries lack access to formal financial services, and as such must either provide self-finance or take informal loans for any agricultural inputs they use. An estimate by the the Initiative for Smallholder Finance suggests that formal and informal financial services cover only about 25% of the $200 billion of credit needed by smallholders globally, although only about 10% of smallholders access insurance and 15% have formal savings (Shakhovskoy and Wendle, 2013). Increasing the proportion of smallholders with access to finance could increase both the quantity and quality of production within value chains for high-value crops, along with farmer incomes.

Smallholder farmers in developing countries face multiple constraints limiting their ability to reach their production potential. One such constraint is access to (formal) finance; smallholders and other agricultural value chain participants frequently cannot access credit necessary to invest in new crops or technologies, deal with risks and shocks, and or savings products to safely carry wealth from harvest to planting. New technologies, markets, and government priorities in several Southeast Asian countries combine to suggest new opportunities are emerging to overcome long-standing challenges to expanding agricultural finance: Those challenges include:

(i) high transaction costs to financing in rural areas;

(ii) managing risks unique to agriculture; and

(iii) knowledge about how to deliver agriculture-based products.

Yet new technology will neither fully eliminate barriers to increased production nor improved resilience against shocks if farmers lack markets for additional output, or if financial providers lack sufficient information to assess potential clients, supervise loans, and address risks. As such, incorporating digital technologies into existing models of whole-of-value chain agricultural finance, or agricultural value chain finance (AVCF) is a potentially attractive approach to increased smallholder farmer returns, financial viability and resilience, and improved livelihoods.[1]

AVCF blends relational contracting with more formal contracting that is observed in modern value chains (e.g. Michler and Wu, 2020; Barrett et al., 2021). A standard AVCF scheme allows a formal lender (e.g. a bank) to lend to a single enterprise (e.g. a processor), which then buys crops from individual farmers. The relationship between the enterprise and farmers can act as a substitute for more formal collateral provided by the farmers. The enterprise can more effectively monitor and screen farmer and provide the individualized loans that banks find too costly to make, while the bank retains the ability to make a formal loan to an enterprise that has business that is easier to understand for its loan officers.

The Context and Case for Agricultural Value Chain Finance

The viability and returns from all financing methods for smallholders are driven by four interacting factors. Multiple constraints unique to smallholder-focused agricultural lending severely limit the business case and value proposition:

1. The risk margin and profile – agriculture, food production and agribusiness are all inherently risky, due to unforeseen events such as weather, climate variability, pests and disease, and market volatility. They are also characterised by unique social and economic factors such as low enterprise economies of scale, lack of collateral, low

[1] Agricultural value chain financing refers to the practice of using relationships within agricultural value chains to provide formal finance. The canonical example is when a bank lends money to a processor, which then either lends to or provides inputs to farmers within its supply chain with whom they have a prior relationship.

individual financial capital and resilience, limited use of bank accounts and services, and poor financial literacy. While default rates can be low, default remains a risk.
2. Transaction costs – the transaction cost of identifying customers, credit screening, technical knowledge and time required to assess the business case and ability to monitor and service smallholder borrowers that are remote to urban branches is very high, particularly to ensure default rates are minimised. As a result, moral hazard is a major concern in such markets.
3. Interest rates – a risk premium is generally added to "base" interest rates to account for the real added risks and costs associated with smallholder agricultural lending, both informal and formal.
4. Loan size – typically, smallholder loans are relatively small, so transaction costs are high and therefore profits per loan small. As a result, the ability of financial services providers to cover their fixed costs of lending is reduced.

AVCF can overcome some of these constraints to smallholder based rural lending. In particular, an AVCF approach can increase efficiency by:

1. Channelling credit and other financial services through SMEs and larger value chain participants, such as large traders with existing relationships with smallholder producers, financial service providers have increased ability to screen potential clients and ensure loan enforcement.
2. Reducing transaction costs, by leveraging contacts with farmers through larger value chain participants, and through synergies across various transactions.
3. Linking financial services with technical and market information, potentially broadening integration and efficiency in service provision.

Examples of approaches to address particular challenges in finance provision include:

1. **Reducing risk**. Risk can be reduced in several ways: Including larger upstream (input suppliers) or downstream (traders and wholesalers); pairing loans with insurance products; pairing loans with agricultural innovations and technical assistance; providing capacity building and training in financial literacy; and encouraging the use of bank accounts and other financial services.
2. **Reducing transaction costs**. Transaction costs can be reduced by: Targeting larger upstream or downstream value chain participants with financial products; using established trust, networks, knowledge, and informal financing arrangements of input suppliers, traders, aggregators, and wholesalers; using farmer marketing groups or cooperatives to channel loans; using local extension providers or NGOs as field finance agents to identify, screen, and support customers; and using technology ("fintech") such to identify, screen and support rural clients.
3. **Increasing loan size**. The viability of rural lending can be influenced by identifying and targeting larger loans and customising credit and financial services to larger upstream or downstream value chain participants who can provide services, inputs, capital or machinery to their customers (smallholders).

The Agricultural Finance Gap in Southeast Asia

As in other parts of the developing world, agricultural finance does not meet credit needs in this project's focus countries (Indonesia, Myanmar, and Vietnam). For agribusiness smallholders and SMEs, limited access to finance often constrains investment and adoption of new technologies and innovations that could help increase production efficiency, quality, and value, and expand market access. Inadequate financial services also limit households' ability to cope with external and unexpected shocks. Yet smallholder producers and agribusiness SMEs are often unable, or unwilling, to access traditional formal rural credit and micro-finance schemes. Even if credit is available, without technical support smallholders or SMEs may not know what to invest in or which innovations to adopt, if fixed costs of adoption are high. Although informal sources of credit, mutual insurance and other support are accessible, these are often insufficient to fully meet needs. For example, mutual insurance is

limited by the fact that if everyone in an insurance group is exposed to a shock (e.g. a weather disaster), they cannot cross-insure one another.

Meeting Development Priorities

When designed, this project aligned directly with three high-level targets of the Australian Development Policy. Two are relatively obvious—the project by necessity engaged with agri-finance and agribusiness private sector actors, and so it engaged with the private sector. By focusing on improving access to agricultural finance among smallholder farmers, a second direct goal was to contribute to poverty reduction. More focus was required to meet a third target, empowering women and girls, so we discuss steps in methodology that were followed to ensure that AVCF activities were designed to be gender inclusive.

AVCF intervention design may inadvertently favour one gender over another, typically men over women. As such, paying attention to gender in AVCF design is particularly important, especially in encouraging take-up and designing technical support. Moreover, it is important to have an understanding of the role and potential role that women play in specific value chains that might be appropriate for AVCF. To address this issue, AVCF design could, for example, specific that women in addition to men must be named as loan beneficiaries.

Nor is gender the only dimension of social inclusion that must be considered; specifically, we note that ethnic minorities often have lower access to finance relative to non-minorities of similar socioeconomic status. In Vietnam, the role of ethnic minorities and the relatively poor were incorporated into decisions on which AVCF options to pursue.

4 Objectives

The project aimed to increase knowledge about how to design and implement innovative and inclusive agricultural value chain financing models in Southeast Asia. It had four specific objectives:

1. Increase understanding about the context and potential for agricultural value chain financing models and approaches;
2. Develop a rigorous impact evaluation design for agricultural value chain financing models that will be implemented by partners;
3. Increase knowledge about how to design and implement innovative and inclusive agricultural value chain financing models in target countries;
4. Enhance awareness and adoption of agricultural value chain financing models.

The first project objective was to increase understanding about the context and potential for agricultural value chain financing models and approaches. To meet this objective, the project organized teams of researchers and practitioners, both national and international, who reviewed present financing models in the agricultural sector and to understand existing models of finance and gaps in coverage. The three reports were closely coordinated across countries, so each report included a cross-cutting framework for evaluating opportunities to implement experiments on agricultural value chain finance models. It built on two prior frameworks—those identified by the Policies, Institutions, and Markets (PIM) CGIAR Research Program, and one developed by MekongBiz specifically for agricultural finance.

The second project objective was to develop rigorous impact evaluation designs for agricultural value chain financing models that would be implemented by partners. An initial step in designing evaluations was to find a set of potential project partners in the target countries, and those partners needed to be willing and able to participate in agricultural value chain finance research. An impact evaluation would not be possible without willing, able, and capable partners. After developing partnerships, impact evaluation research can be designed around those partnerships.

The third project objective is to increase knowledge about how to design and implement innovative and inclusive agricultural value chain financing models in the target countries. Objective 3 is continuous, both being met during the second phase of the project and will continue to be met afterwards. Executing impact evaluations and research generally on agricultural value chain finance requires several activities, including planning and implementing baseline data collection (through direct surveys and/or secondary data collection), intervention roll-out, monitoring each intervention, conducting endline surveys (again through direct surveys and/or secondary data collection), then data analysis and interpretation of the results. Our final activity under this objective involves preparing academic studies for each country, which will outlast the project period itself.

The fourth objective is to enhance awareness and adoption of agricultural value chain financing models. This objective cuts across phases one and two of the projects and includes a number of different pillars. First, the project identified a network of key stakeholders in government, the private sector, and international organisations in each partner country, and have attempted to maintain dialogue with interested stakeholders throughout the project period. Second, we ran both inception workshops and policy workshops in each country at the end of the first phase, to generate interest in the topic and to build an audience for the work. Without the COVID-19 disruption, this component would have been simpler to manage, as policy priorities have changed somewhat in the target countries since the project was developed and then began. In Indonesia and Vietnam, we held final workshops to culminate project learning, and the project initially established a Facebook page, and then migrated reporting to an IFPRI project page. A third activity has been to build capacity in impact evaluation among selected practitioners and individuals within our partner organisations.

5 Methodology

The IFS4Ag project worked in two phases and was conducted in three countries that were selected during the proposal stage—Indonesia, Myanmar, and Vietnam. Because the three countries were chosen to represent unique and different stages of agricultural and financial development, it was recognized that although the project process would be similar in each country, the country level projects could substantially differ. While the first phase was relatively similar in all three countries, the timing differed in each country, and the second phase differed much more substantially than was envisioned in the proposal.

The three selected countries were chosen to represent different stages of agricultural and financial development within Southeast Asia. Of the three countries, Indonesia has the largest GDP per capita. Yet agriculture remains an important part of the economy, as at project start more than half of all Indonesian households continued to have agricultural income. Moreover, access to finance is relatively poor; according to the most recent Global Findex (2021), only 52 percent of adults have access to formal finance. Myanmar is the least developed of the three countries; as a result, agriculture is a larger portion of overall economic output than in the other two countries. Nonetheless, a key feature of Myanmar's agriculture sector is low productivity; in general, land or labour productivity is much lower than in Indonesia or Vietnam. At project start, access to finance was poor, but there were promising features; early in the reform period a large number of microfinance licenses were issued, and smartphone penetration was notably high (around 60% of cell phone users had smartphones), in part because cellular telephone rollouts occurred late relative to other countries.

Vietnam sits between the other two examples. Since its reform period began in 1986, agriculture has been considered a pillar of Vietnam's economy; it has grown despite representing a shrinking share of the overall economy (due to even faster overall growth). At the time of project start, government policy was focused on growing through stronger agricultural value chains. Credit access was the highest of the three countries, at 56% in the Global Findex (2021).[2] While there were credit policies expanding access to agriculture, value chain development had not been a priority prior to more recent Decrees, and agricultural insurance was not widespread.

5.1 Phase 1: Country Reports

The first phase of the project was designed to develop knowledge about the policy environment in each of the three countries from the perspective of agricultural value chain finance. The project was kicked off with an inception workshop in each country, and the workshop was followed by interviews with policy makers and individuals involved in value chain projects, as well as financial institutions, in each of the three countries. After the report was nearing completion in each country, we held a second workshop, to present findings and receive feedback before each report was published.

For each country report, we built a collaborative team that included a practitioner, international researchers, and local researchers. The practitioner included in all three teams was Tom Moyes, then with MekongBiz, who helped each of the teams think through the necessary conditions for agricultural value chain finance to solve problems of finance in value chains. In Indonesia, researchers from IFPRI collaborated with researchers from ICASEPS on building up the remainder of the report, with some help from a practitioner from the PRISMA 2 project (Agus Suwarno) (de Brauw et al., 2021). In Myanmar, the team was comprised of a researcher from the University of Sydney, researchers from the Myanmar Economic Association, researchers from the International Growth Centre local to Myanmar, and a consultant (Mark Middleton) (Basu et al., 2020). In Vietnam, researchers from IFPRI collaborated with

[2] *Note that though the Findex is dated 2021, the data collection took place in Vietnam in 2022 due to lockdowns associated with the spread of the COVID-19 Delta variant.*

researchers from IPSARD on completing the report (de Brauw et al., 2020). In all three countries, the project leader (Alan de Brauw from IFPRI) oversaw the report outline and assured report quality and wrote up lessons from the three reports (de Brauw, 2021) and derived lessons from the report into a book chapter (de Brauw and Swinnen, 2023). In all three countries, we published summaries in English and in Bahasa (Indonesia), Myanmar (Myanmar), and Vietnamese (Vietnam).

Each country report followed the same basic structure, with six chapters:

1. The basic requirements for successful, inclusive agricultural value chain finance;
2. The role of agriculture and finance in the country's economy;
3. The policy environment for agricultural value chain finance;
4. Agricultural value chain finance opportunities in each country, including a prioritization exercise;
5. Conclusion summarizing financial and agricultural policies that shape opportunities for agricultural value chain finance in each country, and brief recommendations about how policy could change for "quick wins" that would help facilitate agricultural value chain finance.

Each report also covered differences that women and men might experience with credit access. To better cover gender differences, a further project note examined issues related to start-up capital for agriculturally focused MSMEs in both Indonesia and Vietnam, finding that women typically have less access to finance and the amount of finance they can access is less than what men can access (Ambler et al., 2020).

5.2 Selecting Pilot Projects

During the proposal stage, we assumed that projects working on agricultural finance that might be interested in value chain finance would become obvious as potential partners in each of the three countries, which could serve as the backbone for randomized control trials in each country. An assumption was also made that the process would take place in parallel across all three countries, and the three pilot projects would all be ready to start at the same time relatively soon after the country reports were completed. The latter assumption was clearly incorrect, as different issues arose in each of the countries at times that either stalled or accelerated progress.

As a result, after the workshops were complete, it was clear we needed to do more work in each of the three countries to find pilot projects. As the workshops were all complete by late 2019, the project quickly ran into a further issue—the COVID-19 pandemic shut down international travel in early 2020. As a result, there was an additional challenge; figuring out methods of working with joint teams searching for projects for collaboration without much prospect of even conducting data collection at least at first.

As a result, in Indonesia and Vietnam collaborators were added to the team to help identify collaborators.[3] In Indonesia, in collaboration with ACIAR we added PT Mitra Asia Lestari, an agricultural consulting firm, to help us evaluate ideas for pilot projects, as ICASEPS continued to help look for pilot projects. In Vietnam, using a recommendation from IPSARD, we hired an individual consultant, Ta Thi Khanh Van, who did a great deal of work talking to agribusiness companies who could be interested in agricultural value chain projects.[4]

[3] *This role was supposed to be played by Innovations for Poverty Action in Myanmar so no additional consultant was necessary.*

[4] *Van held a large number of discussions while trying to find partners in Vietnam; a list of potential partners or those with whom the project was discussed in detail during the COVID-19 pandemic are included in Appendix Table 1.*

In both Indonesia and Vietnam, we talked with several agriculturally oriented financial technology (fintech) companies, since one of the project hypotheses was that the spread of fintech had the potential to lower transaction costs in value chains, and ideally an intervention would take into account a technological application. In both countries, we ended up deciding not to work with agricultural fintech companies. In Indonesia, we felt that their size relative to the overall size of the agricultural economy was small, and so their reach is still relatively small. Moreover, the COVID-19 pandemic changed more prominent agricultural fintech business models, which made them difficult to partner with as they tried to adapt to the changed environment.[5] In Vietnam, the fintech companies we talked with had a difficult time convincing banks to work with them. As the Vietnam project ended up working with a bank, this constraint could not be overcome.

In Indonesia, we looked first for companies or cooperatives that were both in need of additional credit for farmers from whom they purchased crops. We eventually found an interesting case, PT Mitra Desa Pamarican (PT MDP), based in West Java. PT MDP is an example of a new type of corporation that has been emphasized by the government, particularly to develop the rice value chain. In 2017, the government made an example of "Korporasi Petani" (Farmer's Corporation), which are meant to be vertically integrated firms that mill, package, and sell rice either in shops or on the internet. PT MDP fits the above description of a *Korporasi Petani* quite well. It both mills rice and distributes and sells it under the Si Guelis brand, which has three different quality varieties. Si Guelis rice is sold both in local shops and on-line, now through several different on-line shops. From the business perspective, a challenge is that they cannot source enough rice from areas near their mill to run the mill an optimal amount. In fact, PT MDP typically purchases some rice from adjacent Regencies in West Java, rather than being able to source all the rice they need from farmers more local to their mill. So, if finance could help neighbouring farmers produce more rice that they could in turn sell to PT MDP, then agricultural value chain finance could be a solution. Because the number of farmers initially participating was small, we started with a small self-financed pilot (through PT Mitra Asia Lestari). For reasons we describe below, we had to adjust plans after finding this initial pilot; we describe the methodology followed after adjustment below.

In Myanmar, there were already established relationships with Yoma Bank to set up a potential project before the pandemic began, and so there was more a hiatus that occurred while waiting through the initial stages of the COVID-19 pandemic. Unfortunately, just before details about the pilot could be negotiated, the coup occurred, throwing the banking system, among other things, into total disarray, making piloting a project impossible in Myanmar. Instead, we report on a smaller pilot conducted on agricultural finance as part of the training conducted with the Myanmar Economic Association during the first project phase; the main methodology behind that pilot is described below.[6]

In Vietnam, after talking to a number of potential partners, we talked with VietED, an organization that was already helping the DFAT funded Gender Responsive Equitable Agriculture and Tourism (GREAT) project with access to finance in value chain components of its projects. Since the number of farmers any component of the GREAT project was working with was too small for randomization, we worked with VietED (through Van) to select an alternative value chain, arabica coffee, also in northwest Vietnam. We then tried to combine purchasing from a specific coffee company (Phuc Sinh) with a microfinance institution (M7 Microfinance). Unfortunately, M7 pulled out of the project late, and we had to partner with one of the two banks with area branches as a result (Lien Viet Post Bank).

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[5] *A further challenge is that many fintech companies rely on venture capital to grow their businesses before they become profitable. Changes in the venture capital environment in 2023, and rising global interest rates, would have also made an endline survey after a project with fintech companies challenging at the very least.*

[6] *Due to the amount of conflict in Myanmar during the bulk of the second phase of the project, partners working on Myanmar conducted a second study that explores the relationship between conflict and agricultural finance. This study, including preliminary results, is summarized in Appendix C.*

5.3 Phase 2: Pilot Projects

This section will explain the methodology behind the pilot projects selected in the previous subsection.

5.3.1 Indonesia

In Indonesia, we began a small pilot project with PT MDP in the hopes that it would lead to a larger pilot that could be randomized. There were two good reasons to believe that a larger pilot was indeed possible. First, PT MDP had a lot of characteristics that we were looking for in a partner, as described in the previous section. Second, and perhaps more importantly, PT MDP was part of a larger umbrella company, PT Mitra Bumdes Nusantara (PT MBN), which provided PT MDP with the majority of its start-up capital and remained the claimant of 20 percent of any profits.[7] There were another 15 subsidiaries dispersed around Indonesia that could be used to scale a successful pilot (see Appendix Table A.2 for a list of subsidiaries).

We conducted the initial pilot by providing loans to 39 farmers on a per hectare basis, after computing the potential returns to such capital. The initial small pilot was set up to compare the loans that were provided by PT Mitra Asia Lestari, which were set up to resemble a *Kredit Usaha Rakyat* (KUR) loan other than coming in-kind, with two other sources of credit to which other farmers associated with PT MDP had access.[8] The PT Mitra Asia Lestari loans were distributed in-kind based on the amount of land recorded by the farmer group and PT MDP; since they were made on a per hectare basis, and no farmer was growing a hectare of rice, they were all smaller than 6 million Rp.[9] There were comparison groups available for analysis who received KUR loans from Bank Mandiri (36), some farmers who have working capital from the MAI foundation (64), and some farmers who did not desire capital (33).

Unfortunately, for two reasons, after the harvest PT MDP had a difficult time collecting loan repayments of the PT Mitra Asia Lestari loans, which made us pause rather than trying to expand the pilot. A second reason for pause were field visits conducted by the ICASEPS team to the other 15 subsidiaries of PT MBN. The field visits found that most of the companies were unprofitable at best. Some of them, in fact, were not even operational—a rice mill existed, along with employees, but literally no business was being conducted. In other cases, some business was being conducted, but it was clearly not profitable; ICASEPS researchers could only identify three of the 15 subsidiaries (including PT MDP) that were profitable. As a result, the scaling model we had initially in mind would potentially fail badly, as only three of the 15 companies would seem fit to be effective partners, even if others were doing some business. And the idea that three companies could be effective partners was a best case scenario.

So, without evidence that the company could handle individual farmer loans and a scaling pathway that looked far less promising in the field than it had on paper, we decided to look for other cooperatives and/or companies interested in working with us to pilot agricultural value chain finance. We describe this search in the second part of the results section dedicated to Indonesia, and we describe the results of the three resulting pilots in the third part of the results section dedicated to Indonesia.

In preparing for the mid-term review, we further realized that the pilot projects had largely neglected to consider gender. This oversight took place largely as we were scrambling to find pilot projects with strong potential, after challenges with the small PT MBN pilot, and as discussed in section 7. As a result, we ran an additional survey to learn about gender norms as they relate to household finance and agriculture, and we were able to conduct this survey in a large range of places within Indonesia by combining with other work being conducted by

[7] *In turn, PT MBN was started with corporate social responsibility capital.*

[8] *In English, Kredit Usaha Rakyat translates to People's Business Credit.*

[9] *In Appendix Table A.3, we include an analysis of the cost of growing a hectare of rice using optimal inputs projected for the land in Ciamis.*

ICASEPS at the same time. The third part of the research, then, focuses on this descriptive study.

The study uses data from 602 households across 6 provinces, encompassing rice-producing (primarily lowland) and horticulture producing (primarily highland) areas. The survey tool collected data on household and hired labour allocation, disaggregated by stage of production (task). The disaggregation enables analysis that explores explore heterogeneity by gender both geographically and by crop and/or task. The study focuses on these dimensions to explore variation in how households aggregate labour by gender. We present results on male and female labour use on both the extensive (whether labour is used or not) and intensive (the relative share of labour by gender) margins and explore wage differentials by gender for each task.

5.3.2 Myanmar

In Myanmar, largely to help build capacity among partners working with the Myanmar Economic Association, a small pilot project was conducted in collaboration with BRAC in 2019-2020. The pilot took place in two townships located near to BRAC branches in the East Bago region of south-central Myanmar. The study sample comprised 453 farm households across 12 villages who primarily produce rice, along with beans and other staple crops. Participating farmers (who had not previously received a microcredit loan from BRAC) had to complete an application process to become a BRAC customer and meet local regulatory requirements. The sample therefore captures farmers with limited credit access who are interested in receiving a microcredit loan and are therefore could be considered potential adopters of a wider program. Data was collected by enumerators from the Yangon University of Economics, with support from Innovations for Poverty Action (IPA) Myanmar.

The pilot included two main components. The first was the use of an automated credit scoring algorithm which leverages mobile phone data from participants to generate a credit score which can then be used to evaluate credit risk without the typical paperwork and processing associated with traditional scoring. The pilot assessed how this approach performed in a novel context. The second component was a randomized control trial in which participating farmers were assigned to treatment to receive an agricultural microcredit loan or to a traditional loan process where they would apply through a loan officer.

Analysis of the automated credit scoring component was intended to assess its viability in the local context. The tool uses a large training set of phone metadata (which excludes the content of calls of texts) to fit a model which predicts the user's credit score. While this tool has been implemented in a range of countries, it was unclear *ex ante* whether it would provide valid information for a specific sub-population of low-income farmers in Myanmar, and hence the performance of the prediction model. The research uses regression analysis techniques to measure correlations between the credit score and farmer information obtained from household surveys.

For the randomized control trial, the sample is divided into two groups: those assigned to treatment who automatically received a loan, and those assigned to a control who went through a traditional application process. As a result, the control contains both successful loan applicants as well as farmers whose application was rejected. The analysis uses difference-in-difference estimation to measure the causal impact of the loan treatment (relative to the control) on a range of outcomes, including agricultural input expenditures, financial activities, earnings from agriculture, and earnings from non-agricultural activities. Additionally, because the application decision is observed for the control group, the study uses propensity score matching to explore differences in outcomes for those in the treatment group who would have (or would not have) been excluded from receiving a loan using the traditional application approach.

5.3.3 Vietnam

In Vietnam, after the long search above, the project team was able to determine partnerships could take place with though VietED, with the Phuc Sinh coffee company and the local branch of Lien Viet Post Bank in Son La. Phuc Sinh strives to only purchase coffee that is certified by the Rainforest Alliance, and so one of the conditions was to find farmers in groups from which Phuc Sinh regularly purchased coffee, but either were newly certified or required certification.[10] Working with the main buyer for each cooperative, the company was able to put together a list of roughly 1100 farmers for potential inclusion in the study. The certification allows farmers to obtain a small premium for their coffee from Phuc Sinh or other buyers interested in certified coffee.[11]

To make loans potentially attractive to farmers, VietED, IFPRI, and Lien Viet Post Bank worked together to consider loan packages that would both fit the needs of coffee farmers and fit within existing regulations for loans. Farmers have need for working capital while they are producing coffee. They need fertilizer, appropriate pesticides, and light equipment used to spray; they also have need for labour, which is sometimes hired, to care for coffee bushes and then to harvest at the right time. These capital needs can be acute during the latter half of the production cycle, but are particularly acute right at the beginning of the cycle (close to the beginning of the calendar year), when there is a crunch to spend money to ensure good production will occur later in the year. Some farmers in these areas are eligible for VSBP loans, but others have a clear need for finance. So in this context, both of the primary necessary conditions for agricultural value chain finance exist—there is a company with what can be considered a need or a desire to increase the amount of raw agricultural product they are buying, and there are farmers who can enhance their production and sell more product to that specific company.

Farmers might not obtain formal loans for several reasons, but a key reason is that they may not conform to farmer needs. To deal with this concern, our partners VietED worked with the Lien Viet Post Bank to develop products that would better fit the needs of farmers either in the "medium" term or the short term (we eliminated the possibility of, for example, replacing coffee bushes or trees due to the project timeline). VietED worked with Lien Viet Post Bank to develop two products that could potentially be marketed to farmers, and that conform to any financial regulations faced by Lien Viet Post Bank (or other banks). The products are described in Appendix Tables A.4 and A.5.

Therefore, we designed contracts around the idea that households would have a period of steady income when coffee could be harvested, but that payments might not be required during the period when there is no income. To summarize, the idea is to offer loans backed by Phuc Sinh to farmers who are already in their growing area, with the goal of increasing quality production through improved inputs. Farmers will be offered loans, and the idea is that they will be paid back largely through sales to Phuc Sinh. The loans will be offered by Lien Viet Post Bank, with the backing of Phuc Sinh in this case. VietED is helping to organize the overall project.

Before discussing details on how the product was offered, a final important issue is how Phuc Sinh actually purchases coffee from farmers. In each hamlet or village, Phuc Sinh has a purchasing agent, and this trader typically collects coffee from farmers and sells to either Phuc Sinh or another local company. Conditional on quality attributes being met, Phuc Sinh sets a price for wet coffee, and the purchasing agent compares that price to prices being offered by other companies before deciding to whom to sell the hamlet's coffee and distributing proceeds

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[10] Note that the Rainforest Alliance certification merged with the UTZ certification; both are well known "sustainability" certifications in Europe, the end market for much of Phuc Sinh's coffee.

[11] Note that the premium is small, and so there is no guarantee that certified coffee is sold as such; as we learned during the course of the study, sometimes a processor is in need of coffee and will pay a premium over the certified price and so some certified coffee is sold as uncertified because those processors are paying more that day (or during that period) than certified producers.

to farmers. The purchasing agent is a community member and can be replaced by Phuc Sinh if complaints come from hamlet farmers.[12]

To ensure that farmer transactions are at worst not affected and at best improved through crop sales, which take place through the purchasing agent as above, purchasing agents are being trained once the loans are in place to ensure that enough sales go through to Phuc Sinh instead of to other local buyers to make those payments. The idea will be to make sure at least the minimum amount necessary to make loan payments within a given time period is sold to Phuc Sinh. The hotline is being emphasized to farmers to ensure that the prices they receive are fair, and random auditing led by VietED will take place to ensure that farmers receive fair prices for their wet coffee sold to Phuc Sinh.

Loan Marketing

To market loans to farmers in the village, we conducted a randomized control trial. We used the 1100 registered farmers, and initially randomized them into two groups, one of which will be offered the new loans. The loans were initially introduced to farmers in an information session which included Lien Viet Post Bank officials and VietED, and the randomly selected farmers in each group were invited to these information sessions.

After realizing most of the farmers registered with Phuc Sinh were men, we further devised a plan to test a gender sensitive method of loan offers—we further randomized the treatment farmer group into two groups—one for which just the main farmer would be invited to the information session, and a second group for which both the main farmer and his wife would be invited; if both showed up, they received a small gift in the latter case.

Information sessions were provided for farmers at two different points in time. For farmers with a longer time horizon and/or more immediate funding needs, both the longer term and the shorter term loans were offered in sessions that took place in late July. Any farmers desiring a loan were then to be signed up in a first wave, which would help work out kinks before the larger demand takes place at the end of the year/beginning of the following calendar year. Only the shorter term loan product will be offered in the beginning of next calendar year, due to the project length.

Some lessons came about through the loan marketing in the first stage. First, it became clear that Phuc Sinh should play a more visible role in loan marketing. Farmers were somewhat distrustful of the VietED/Lien Viet Post Bank team, at least in speaking for Phuc Sinh. Therefore, Phuc Sinh also played a role in marketing the second batch of loans. Second, there was a clear lesson that the two groups formed for marketing purposes (individual versus couples) was overcomplicated. Despite good intentions, farmers found this point confusing, as to why both needed to show up for the information, so we abandoned that component for the second set of information sessions.

Surveys and Adaptive Methodology

The baseline survey attempted to closely adhere to Phuc Sinh lists in the 12 villages for which data were provided. We found that there were a handful of households for which two members were listed, as different sellers of coffee to Phuc Sinh. We ended up with a sample of 974 households with complete data; of those, 488 are included in the groups receiving loan offers. Since then, we pulled any of the 12 village leaders out of the design, so the total sample for the purposes of randomization is 966 households.

Initially, an endline survey was planned among the same households, and we planned a standard ANCOVA analysis (e.g. McKenzie, 2012). However, very few households took up either the pilot or the main loans—only 35 households among the 488 included in one of the treatment groups took up a loan offered by the project. As a result, we pivoted the endline

[12] *Phuc Sinh runs a complaint hotline for that purpose.*

survey to study both the impacts of the contract using an alternative methodology, and to learn about why the loan offers were not popular among farmers.

The former part will include a condensed household survey asked among a specific population—households that received (and paid back) loans from the treatment group(s), and households in the control group that were matched to the loan receiving households using coarsened exact matching. The matching procedure, described in the results section, ensured that all the loan receiving households had matches, but that meant there were more matches than needed. Hence, we randomly selected households from within the matching control group for data collection. The survey will be used to study the outcomes listed in Table 1 below, other than take up (for which we will use administrative data). The latter part of the data collection included qualitative work designed specifically to understand the reasons that households did not take up the loans. The qualitative work includes focus groups and informational interviews; the instruments are in Appendix D.1.

Table 1. Outcomes for Quantitative Study, Vietnam

Outcome	Measurement
Loan Take-up	Indicator, Take up of LVPB Loan
Financial Access	Indicator, Any Formal Financial Account Access including Loan and Bank Accounts
Specific Types of Inputs (Labour, Herbicides, Pesticides, Fertilizer, Other)	Labour in days hired; other types in value
Total Inputs	Total Value of Inputs
Coffee Output	Kg of Coffee Produced
Prices	Average Price for Coffee Produced
Value, Coffee Output	Total Value, Coffee Production
Household Income	Logarithm, Total Household Income

6 Achievements against activities and outputs/milestones

This section is structured by each objective. We include a table under each project objective and then describe how the milestones were met, on a country-by-country basis. We use this format as several of the activities could not be conducted in Myanmar. In some contexts, we also provide evidence about outputs that bring together cross-country learning.

6.1 Objective 1: Increase understanding about the context and potential for agricultural value chain financing models and approaches

Objective 1 was to increase understanding about the context and potential for agricultural value chain financing models in the three countries. The seven activities were designed to provide a step-by-step process by which the project would meet the objective in each country. Table 2 below describes which activities were completed, and the activity that was not completed due to the coup in Myanmar. It also highlights the activity that was conducted once for the three countries (Activity 1.2).

Table 2. Activities Conducted to Meet Project Objective 1, by Country

No.	Activity	Indonesia	Myanmar	Vietnam
1.1	Organise teams composed of national researchers, policy experts, practitioners and research team, to develop clear work plans for each with deliverables and a timeline for each country	Completed	Completed	Completed
1.2	Develop value chain analysis framework focused on agricultural finance, adapting from MekongBiz or other frameworks, incorporating role of financing and social inclusivity	Completed (one framework for all three countries)		
1.3	Identify donors and NGOs working with financial institutions in designing and implementing AVCF interventions, as well as rural finance providers that could expand in geographic areas and with potential interest in expanding finance options to most appropriate value chains	Completed	Completed	Completed
1.4	Conduct a review of background, opportunities and constraints for the application of innovative and inclusive models of agricultural value-chain finance in each country	Completed	Completed	Completed
1.5	Conduct rapid value chain appraisal using analytic framework built around finance to identify best potential value chain entry points in each country	Completed	Completed	Completed
1.6	Review and analyse gender/youth/minority roles in selected value chains/geographic areas, including finance, identifying risks	Completed	Incomplete (coup)	Completed
1.7	Based on analysis, develop short list in each country of potential opportunities for projects, and then compare and contrast them to find potential research synergies	Completed in Vietnam; replaced with additional deliverable		

Much of the evidence for completion of this objective is included in the three country reports (de Brauw et al., 2021; Basu et al., 2021; de Brauw et al., 2020). Each case study includes the first five activities listed, and included a detailed policy analysis of constraints that might exist in each country for implementing agricultural value chain finance models. The project summarized lessons from the three country reports in a shorter paper (de Brauw, 2021).

When the proposal was written, it was assumed that Activities 1.6 (reviewing roles of gender/youth/minority in selected value chains) and 1.7 (short list of projects) could be developed at the same time as the country reports. For the former activity, we completed a report on existing data from Indonesia and Vietnam during the first part of the pandemic (Ambler et al., 2020). However, this activity was incomplete in Myanmar when the coup occurred. The latter activity was more challenging to do than had been expected, as there were not a large number of projects ongoing in Indonesia and while we had a list in Myanmar, it became invalidated by the coup.[13] As a result, we replaced this activity with conceptual analysis of four way agricultural value chain finance, which came up as important through the pilots conducted in Indonesia (de Brauw, 2024).

6.2 Objective 2: Develop a rigorous impact evaluation design for agricultural value chain financing models that will be implemented by partners

The second objective of the project was to develop rigorous impact evaluation designs to be implemented by partners. We included eight activities under this objective (Table 3); since we could not conduct impact evaluations in Myanmar due to the coup, we do not report on objective 2 for Myanmar.

Table 3. Activities Conducted to Meet Project Objective 2, by Country

No.	Activity	Indonesia	Vietnam	Notes
2.1	Develop relationships and identify potential private and public sector implementing partners.	Completed	Completed	Adaptive process in both countries
2.2	Conduct due diligence on potential private sector or NGO partners	Completed	Completed	
2.3	Analysis of potential gender impacts of proposed projects	Added gender component to work	Included gender arm in initial RCT design	Adaptation in Indonesia prior to mid-term review
2.4	Final identification of project value chains, geographic locations, collaborators, and interventions	Completed	Completed	
2.5	Develop detailed interventions, evaluation research design, updated research questions and roles of partners for each country	See comment	Completed	Output was designed around randomization that did not occur in Indonesia; detailed plan was completed in Vietnam
2.6	Host a virtual peer review workshop. This review workshop will also serve as a formal ACIAR review (replacing the usual mid-term project review).	Replaced with virtual mid-term review.		Outcome of COVID-19 pandemic.
2.7	Compute sample size for randomized control trials large enough to detect impacts, and agree with implementation partners upon implementation plan to ensure enough beneficiaries to detect impact in research component	No RCT	Completed	Was more designed around what was possible in Vietnam rather than detailed power calculations

[13] Many discussions were held in Vietnam while trying to find partners; a list of potential partners or those with whom the project was discussed in detail during the COVID-19 pandemic are included in Appendix Table 1.

2.8	Prepare and submit project variation updating interventions, research design and budget for Phase 2 evaluation studies for ACIAR approval	Completed	Completed	

There are several points worth a brief discussion related to this objective. First, there was an assumption while writing the proposal that all three countries would work in parallel. It became obvious soon after the project started that progress would be uneven across the three countries, even before the COVID-19 pandemic. Second, it was not simple to convince partners of the value of conducting randomized trials. A major constraint was also the sample size required to find impacts on outcomes of interest; in general, many AVCF projects tend to have small sample sizes, making them more like a proof-of-concept study than anything. Finding partners with access to "enough" suppliers was a challenge in both countries. For example, in Indonesia PT MBN might have had enough access to farmers for a large enough sample size for reasonable statistical power, but efforts to conduct a randomized trial ended after it became apparent that its subsidiary PT MDP was not going to be an effective "scaling partner". Third, this objective was most affected by the COVID-19 pandemic; it took some months for us to reorganize, hire local partners in Indonesia and Vietnam, and train them in what we hoped to achieve in the project.

6.3 Objective 3: Increase knowledge about how to design and implement innovative and inclusive agricultural value chain financing models in target countries

Objective 3 was met during the second phase of the project and includes 11 specific activities that were designed specifically to match the activities required to conduct randomized control trials. Since the research process was adapted in Myanmar, Table 4 limits reporting to Indonesia and Vietnam, and it indicates clearly where activities were not relevant in Indonesia because we did not attempt to conduct a randomized control trial. We explain a few other points in the notes and describe points relevant to objective 3 below the table.

Table 4. Activities Conducted to Meet Project Objective 3, by Country

No.	Activity	Indonesia	Vietnam	Notes
3.1	Initiating data collection through contract or other with partners in each country	Completed	Completed	Completed through ICASEPS for each pilot in Indonesia
3.2	Develop baseline surveys and survey protocols in each country	Completed	Completed	
3.3	Obtain human subjects approval from institutional review boards both nationally (if relevant) and from IFPRI	Completed	Completed	
3.4	Train enumerators and conduct baseline surveys in each country	Completed	Completed	
3.5	Conduct analysis of gender indicators in baseline survey	Completed	Completed	Gender analysis in Indonesia is on gender survey; in Vietnam on baseline and can be found below
3.6	Conduct randomization among sample in each country, and conduct balance checks	N/A	Completed	Conditional on a randomized trial taking place
3.7	Ensure implementation of projects in each country; for research important to develop robust monitoring system, collect administrative data	Completed	Completed	See above (3.1)

3.8	Design endline surveys and survey protocols in each country	Completed	Completed	In Indonesia, surveys followed each pilot; also completed gender survey as described above
3.9	Train enumerators and conduct endline surveys in each country	Completed in house	Completed	
3.10	Analyse data to determine impacts of project in each country and produce initial fact sheets, policy papers, briefs	In progress	In progress	Some data analysis included in this report and we continue to work it into final briefs and scientific outputs.
3.11	Produce final scientific outputs	In progress	In progress	

In both Indonesia and Vietnam pilot projects were conducted following along Objective 3. In Indonesia, in general data collection took place one time for each pilot project, though the additional gender project component took place in a larger set of communities than the three pilots. A main innovation to data collection by ICASEPS was both applying for Internal Review Board approval and requiring informed consent from participants. These procedures had not been followed in past ICASEPS projects, so this outcome is a real advance among participating researchers.[14] It is finally worth noting that in each pilot, the ICASEPS team and PT MAL did robust monitoring of repayment performance.

In Myanmar, the project did conduct analysis on the BRAC credit trial among 453 farmers described in the previous section; in collaboration with BRAC that took place under the guise of a World Bank project in 2019.[15] We describe the results of this credit trial in the following section. This research is being used to help build up the evidence base about aspects of agricultural finance in the three target countries and as a scientific output of the project.

In Vietnam, the pilot project more closely followed the activities as described above. After a project was identified with a large enough sample size to conduct randomization, we planned and conducted a baseline survey with a collaborator. We put in place systems to ensure that we understood how repayment of loans would take place, and managed the project both through the partner (VietED) and by project researchers. The endline was adjusted when demand for loans was lower than expected; as a result, we focus the endline activities on qualitative interviews to understand why demand was low, while including a short survey among a small subset of identified farmers to measure quantitative outcomes as described above.

In general, we note that the production of scientific outputs can take time, particularly when results or processes to achieve the objective took unexpected turns. In each of the three countries, the project will lead to academic outputs that remain in preparation as this report is submitted.

6.4 Objective 4: Enhance awareness and adoption of agricultural value chain financing models

Objective 4, which was to enhance awareness and adoption of agricultural value chain financing models, both among our partners and among larger communities related to agriculture and finance more generally in each of the target countries. This objective was meant to be met over the course of the project in each of the three countries, so cuts across

[14] As many of the participating researchers from Indonesia had moved from ICASEPS to the nascent National Research and Innovation Agency (Badan Riset dan Inovasi Nasional, or BRIN), this capacity carried over to BRIN as well.

[15] While it is not indicated in the table above, the data collection in Myanmar also obtained internal review board approval from the University of Sydney Human Research Ethics Committee, project number 2019/873; the randomized component was also registered with the American Economic Association Randomized Control Trial registry, with reference number AEARCTR-0005452.

the two phases. At project inception, we conducted workshops in all three countries.[16] We followed the inception workshops with policy workshops roughly one year after the project inception, to discuss the country level policy reports. After a long delay for COVID, we conducted two further workshops in Indonesia, including a final policy workshop, and one further workshop in Vietnam, that acted as a culminating workshop for the entire project. We include 5 specific activities under Objective 4 in Table 5.

We also established two project websites. At project inception, IFPRI did not create project level websites, so we established a project website on Facebook, recognizing that Facebook acts as the "internet" in Myanmar.[17] Due to changes in IFPRI policy, we migrated project information to an IFPRI project page during the project, which will last long past the project end, and began to post project papers and blogs there, leaving a link on the Facebook page to the IFPRI project page. The IFPRI project page will remain part of the IFPRI website long after the project has ended.

Table 5. Activities Conducted to Meet Project Objective 4, by Country

No.	*Activity*	Indonesia	Myanmar	Vietnam
4.1	Identify a network of key stakeholders in government, the private sector, and international organisations in each partner country, and maintain a dialogue with this network throughout the project period.	Completed, but agriculturally rather than financially focused	Completed prior to coup; abandoned thereafter	Completed
4.2	Organise and run a major workshop in each partner country at the end of year 1, run regular annual briefings, and another major workshop at the end of the project cycle.	Completed	Completed first part	Completed
4.3	Brief training workshops at project inception, and more detailed RCT capacity building workshop held at similar time to country workshop.	Completed	Completed	Done, but much training through repeated interaction
4.4	Conduct training workshop on gender analysis at country workshops at end of year one.	Completed	Not complete	Completed
4.5	Make the results of the year 1 review reports and subsequent policy outputs (e.g., research briefs) accessible in written form to key stakeholders.	Completed	Completed	Completed

We found several challenges worth further discussion in meeting this objective. First, the design of a project with policy reports followed by randomized trials does not lend itself well to continued engagement with a set of key stakeholders. The project team did not find much difficulty in pulling together interested stakeholders in any of the three countries, and inception workshops and first year policy workshops were well attended. But even without COVID-19, even if we had had projects pulled together, it would have taken time for the next set of workshops to take place, and that delay really loses "momentum" in that engagement. The travel restrictions associated with the COVID-19 pandemic certainly exacerbated this challenge. Intentionally staggering trials or adding research alongside the trials that can keep stakeholders engaged would be a better design overall.

Second, there is a disconnect between the engagement one gets from a policy audience in major cities (e.g. Hanoi, Jakarta/Bogor, Yangon) and the audience that might be more

[16] Initially, we planned to conduct one inception workshop for all three countries, but there were initial complications getting the project started in Indonesia, and after attending the Vietnam workshop, the local Myanmar team felt it would be a good idea to also conduct such a workshop in Myanmar.

[17] A key point is that the main ways of using the internet and social media evolve over time. For example, the "homegrown" Zalo is now clearly the preferred messaging app in Vietnam, while that was less clear when the project started. On the other hand, Whatsapp is heavily used in Indonesia, and has been since project inception.

appropriate—namely, local bank staff in rural towns. For example, in the context of Lien Viet Post Bank, decisions about credit to farmers are made at that local level, and so they are the people who need to be convinced about agricultural value chain finance models. We initially had in mind that technology companies and fintech could get around the local lending problem, but we found that fintech providers were relatively small (in Indonesia) and had difficulty linking with banks (in Vietnam).

Third, it is worth noting that global priorities have shifted since the project inception took place. Climate change has become a much more prominent issue and has important implications for financing agriculture that must be thought out, both in terms of changing basis risk (in terms of insurance), and changing needs (more climate resistant crops and means to grow them). A second change has been concerns related to food systems, as non-communicable disease challenges have become more prominent in low and middle-income countries. Many governments in Asia, including Indonesia and Vietnam, have developed food system transformation strategies since project inception, which represents an overall priority change (Nurhasan et al., 2021; Decision 300/QD-Ttg, 2023).

7 Key results and discussion

In this section, we pull together key results from each country. We begin each country subsection by summarizing the results from the country report written in the first phase of the project, and then describe results from the pilot project. We pull together lessons from the pilot projects below in the conclusions section.

7.1 Indonesia

As discussed in the methodology section, because of the iterative nature of the research that took place in Indonesia, we include four subsections below. First, we briefly summarize findings from the country report from the first phase of the project (de Brauw et al., 2020). Second, we discuss the search for pilot projects, which provides us with an important finding. Third, we discuss results from the three pilots that were conducted. Fourth, we discuss the research we conducted on gender roles in agriculture and finance, for better design of future agricultural finance projects paying attention to gender issues.

7.1.1 Findings from the Country Report

Rather than repeating the analysis from the country report here, we highlight two types of policy changes that our analysis finds would be helpful for agricultural value chain finance to progress. We considered both financial policies and agricultural policies that can help foster an environment for agricultural value chain finance to help meet unmet demand for agricultural finance more generally. Our recommendations were as follows:

Consider flexibility in KUR loan terms. Under the assumption that KUR loans are a pillar of small enterprise policy, more flexibility could allow growth in agricultural lending. For example, allowing alternative sources of collateral could be used to expand the maximum size of micro-KUR loans without explicitly requiring collateral.

Catalyse the use of alternative forms of collateral. Regulation allows for alternative forms of collateral in Indonesia, but it is infrequently used at present. From an agricultural value chain finance perspective, alternative forms of collateral can help catalyse lending as it reduces the transaction costs to smallholder lending.

Consider a gradual reduction of fertilizer subsidies. Fertilizer subsidies distort incentives for producers, which can change choices about what commodities to grow. Since the fertilizer subsidy has been a long-standing policy, a gradual reduction would reduce adjustment costs among farmers and input kiosks as they find more profitable opportunities with a different product mix. A subsidy reduction would also provide budget flexibility for the Ministry of Agriculture with which to pursue other policy priorities.

Support crops with comparative advantage. Agricultural trade allows countries to specialize in products for which they have comparative advantage. The goal of “food sovereignty” can work against comparative advantage by promoting products that are targeted to attempt to reduce imports. A better goal for support, through agricultural research and potentially through development of value chains, would be crops for which Indonesia has a comparative advantage. Given the rainfall, rich soil, varied topography, and varied climates, fruits, vegetables and spices or more specific examples of each are more likely to have comparative advantage in export markets.

Continue work on agricultural insurance. Agricultural insurance can be an effective tool to encourage investments that are viewed as risky by smallholder farmers but have high returns. Providing insurance linked to weather conditions reduces risks for farmers and allows them to make profitable investments. Indonesia’s government has piloted insurance schemes on rice and beef insurance and further pilots could help develop mutually advantageous products.

7.1.2 Pilot Project Search

As described above, during the second phase of the project the local research team conducted an extensive search for potential partners for pilot projects, particularly after it became clear that the partnership with PT Mitra Desa Pamarican was not going to be sustainable (or scalable). The search led the team to introduce the project goals to a fairly large number of potential partners in six different provinces.

The team ended up choosing to conduct a first pilot project among shallot farmers in Nganjuk Regency of East Java Province; the farmers all sell to UD Oglyx Pandiga (UDOP), an off-taker. UDOP buys directly from farmers, and ensures high quality production by offering some training to farmers in proper growing techniques. The cost of shallot production per hectare is quite high relative to rice production (see Appendix Table A.6), so the in-kind credit that was provided to farmers was partial credit, to help them purchase fertilizers that enhance yields. This trial took place in 2022.

After the successful trial with UDOP, a third trial was planned with Kelompok Tani Harapan VIII (KPH), a vegetable cooperative that collects and sells vegetables for farmers in Malang regency of East Java Province. The village leader in KPH had developed connections as an off-taker to ensure the sale of their vegetables, but farmers lack all the liquidity necessary to maximize production. The farmers grow several different vegetables (cabbage, Chinese cabbage, celery, lettuce, and carrots). The variety (and differential timing of harvest) allows the village to distribute produce to suppliers on a regular basis. As a result, the goal of this pilot was similar to the UDOP trial—to provide partial credit to farmers to help them improve the quality and quantity of the vegetables they produce given that a market exists for that product. Again, the idea was to pay partial production costs, rather than the substantial full production costs (Appendix Table A.7). The latter trial took place at the end of 2022 and the beginning of 2023.

From the UDOP and KPH perspective, an AVCF scheme could be attractive due to the ability to increase the amount of product available for their clients. The additional participation costs they incur include administration costs for distributing the funds/in-kind purchases to farmers, and training costs. Additional costs should be outweighed by higher returns from additional production and potentially from increased returns to handling vegetables on a per-unit basis.

As noted above, UDOP and KPH were among a large number of potential partners who were approached by the research team. The potential partners approached who were not selected are summarized in Appendix Table A.8. Succinctly, while the research team approached 29 other potential partners, only a few potential partners were willing to participate in a small pilot project. And some were deemed inappropriate by the research team themselves. Specifically, seven potential partners were not interested, and eight suggested they had no or only a small need for additional credit. The project deemed seven potential partners too risky; only five of the potential partners strongly considered participation.[18] As a result, after some extensive searching, there were just not many quality partners available.

In sum, the project visited more than two dozen different potential partners, but only ended up working with two beyond PT MDP. Several of them did not want to work with us—they did not want credit—and some of them were inappropriate for other reasons—this is a key result, as it is consistent with findings from Vietnam (lack of demand for credit).

7.1.3 Pilot Project Results

Here, we summarize descriptive results from the PT MDP, UDOP, and KPH trials. We note that in each case study, data collection occurred post-trial, and there are comparison groups

[18] *A further two rice producers rejected the idea of participation because they desired subsidized fertilizer rather than commercially available fertilizer. In the country report described above, we discuss the potential for the fertilizer subsidy to "crowd out" finance opportunities for agriculture; this is direct evidence of an effect the fertilizer subsidy policy has on finance.*

included in each data collection effort. However, there are two issues. First, the comparison groups typically are farmers who did not need credit before the trial began. Hence, there may not be an observable difference from the groups that did receive credit, since there could be reasons we cannot observe that the two groups are different. Throughout analysis of the results, we keep that point in mind. Second, the samples are relatively small, and so regression analysis is unlikely to yield large enough differences to consider statistically significant. Therefore, in each trial we typically provide descriptive results and a discussion of the findings.

PT MDP (Ciamis Regency, Rice)

In the PT MDP trial, data were collected post-trial among four broad groups—households receiving KUR loans from a bank, households who have access to capital from the MAI foundation, households receiving loans from PT MAL, organized by the project, and a comparison group that did not receive loans. The total sample size is 169 households; 100 who had other access to capital (either a KUR loan or from the MAI foundation), while 36 households received a project loan, and the control group includes 33 households without access to capital. For purposes of analysis here we can split the data into three groups—a group that received KUR loans or bank credit, the treatment group (which received credit from PT MAL), and the control group (which did not receive credit).

We initially construct four variables measuring agricultural performance: labour expenditures; expenditures on other inputs; farm revenue, and profits. Labour expenditures is the sum of reported expenditure on wages for hired male and female labourers respectively, across the season. For non-labour inputs, we calculate total expenditures on fertilizer (organic and chemical), pesticides and herbicides, as well as expenditures on renting land and insurance. By taking loans or through access to additional capital, we assume farmers can alleviate a constraint on purchasing some type of inputs (chemical or labour), which should lead to increased production, revenue, and therefore higher profits.

We initially graph average input expenditures, labour expenditures, revenue, and profits, by group as described above (Figure 1). We find that average input expenditures are slightly higher among both groups receiving credit than the “no credit group”, though the error bars on the bars suggest these differences are not statistically significant. Similarly, average labour expenditures are higher among both credit groups than the control group. The revenues among both credit groups are also higher, and indistinguishable from one another. The top of the confidence interval for the control group is roughly equivalent to the two groups receiving credit, indicating a large difference. Profits are therefore slightly higher among the two groups receiving credit as well than average profits among the control group. Note these findings are only suggestive that credit could have alleviated constraints, as there are many observable and unobservable factors that could differ between the three groups. Nonetheless, it does appear the PT MAL loans could have improved revenues and profits among farmers in the PT MDP zone.

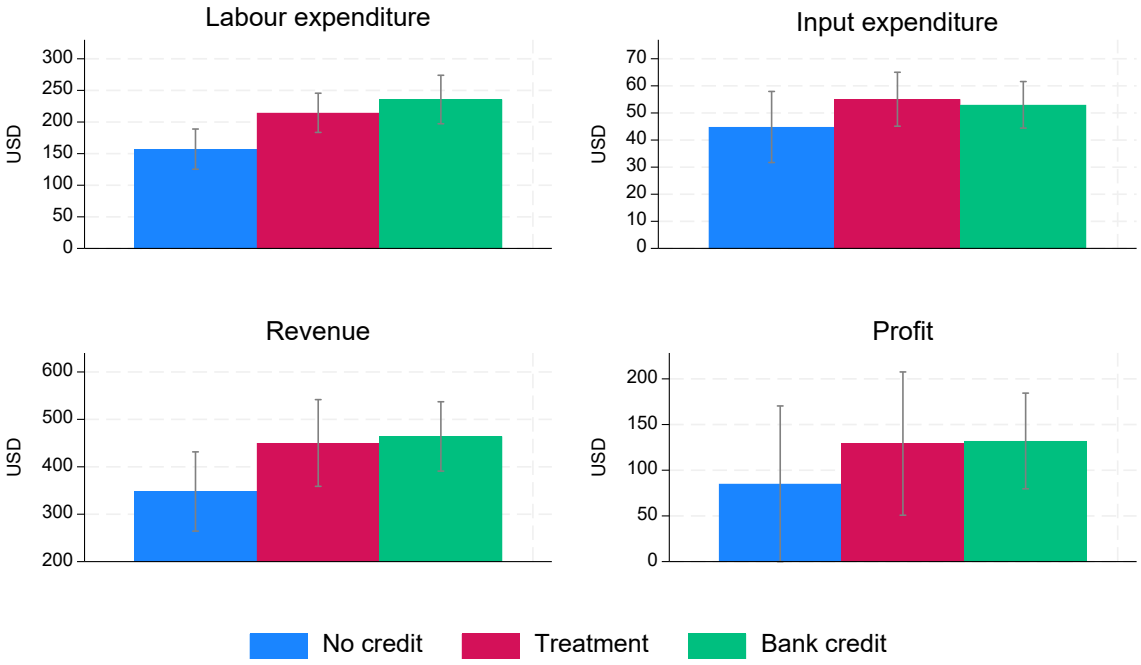


Figure 1. Average Revenues, Expenditures, and Profits, Households in the PT MDP Trial, by type of credit, Ciamis Regency, Indonesia, 2022

Given the promising averages in Figure 1, we next attempt to explain variation in these outcomes in a simple regression framework (Table 6). The regressions control for both treatment and KUR group membership relative to the control group, and for the sown area in rice. The results show the treatment group has higher input costs and labour expenditures than the control group, significant at the 5 and 1 percent levels, respectively. Revenues and profits are also higher, but the differences are not statistically significant.

Table 6. Correlations between Outcomes, Treatment, and Credit Access, Profits, Households in the PT MDP Trial, Ciamis Regency, Indonesia, 2022

	Revenue (USD)	Input Costs (USD)	Labour Costs (USD)	Profits (USD)	Hired male days	Hired female days
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	107.1	10.79**	58.13***	38.02	2.103**	4.029***
	(51.68)	(3.617)	(11.95)	(55.11)	(0.590)	(0.861)
Credit	86.30**	5.910	65.24***	12.67	2.184*	2.807**
	(28.48)	(3.711)	(10.61)	(39.33)	(0.926)	(0.691)
Area (hectares)	165.2*	19.34***	77.28***	163.8**	2.617	7.729
	(59.99)	(4.192)	(14.36)	(58.28)	(1.441)	(4.746)
Constant	162.4***	26.56***	124.7***	-79.61**	2.019	2.819
	(23.59)	(4.900)	(13.49)	(22.22)	(1.213)	(3.369)
Observations	169	169	169	169	169	169

Notes: Ordinary least squares regression with standard errors clustered by regency. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively.

The fifth and sixth columns examine the number of days of hired labour used, by gender (Table 6). The results suggest loans helped households hire more labour, presumably helping them increase yields through improved input application, weeding, or both. Households without credit access may face liquidity constraints making them unable to hire labour. However, we again stress that as the groups were not randomized, it could be that the differences reflect

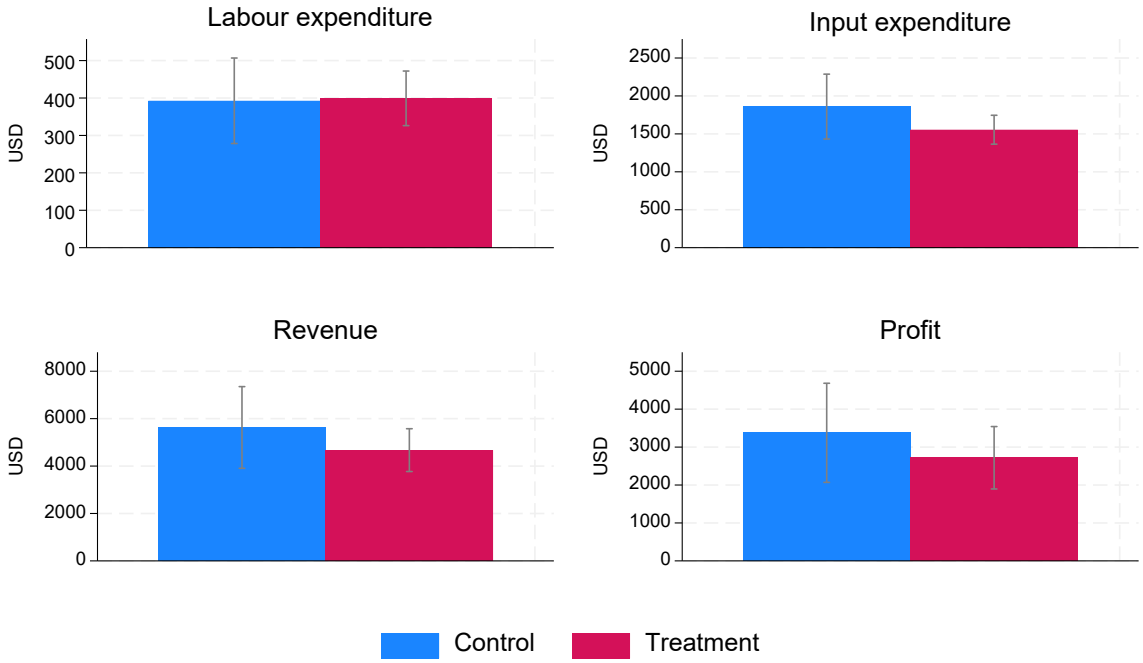
other, unobservable differences between the households in the two credit groups and non-credit recipients.[19]

Although these results are promising, households receiving PT MAL loans did not pay them back in a timely manner. The final non-performing loan rate was relatively low (5%), but PT MAL and the ICASEPS team put a great deal of effort into ensuring the loans were repaid. When the decision about whether to expand this trial was made, the non-performing loan rate was still quite high. It was not clear why PT MDP could not set aside money from purchases from these farmers to pay back PT MAL; we suspect this challenge had to do with their obligations to the umbrella company (PT BMN). We come back to corporate arrangements and AVCF in later sections.

UDOP (Nganjuk Regency, Shallots)

The second trial took place among shallot farmers in Nganjuk Regency who sell shallots to UDOP. As discussed previously, the credit was partial, since production costs per hectare are high. As with PT MDP, the data collection took place post-production. In this context, we compare the farmers who received credit with farmers who did not receive credit. In this context, 25 farmers received credit and 25 farmers did not, so we simply illustrate average differences in primary outcomes rather than using regression analysis.

Unlike the PT MDP trial, we find that input expenditures are lower among the credit group than among the control group (Figure 2). Note input expenditures are substantially higher among shallot farmers than among rice farmers in the previous trial; average input expenditures are around $1500 for the treatment group, relative to $50 on average for rice. It is less clear that these farmers have large actual credit needs, given the substantial input costs they face. Labour expenditures are also quite high at close to $400 on average. Note that average labour expenditures are almost the same for the two groups. Some farmers still bought, in cash or on credit, the additional inputs required (fertilizers, pesticides) by themselves since the credit from PT MAL was only partial.



[19] *A different method of analyzing the data is through stochastic frontier modeling (e.g. Coelli et al., 2005), which was conducted by BRIN and ICASEPS researchers for internal project reports. This analysis effectively shows that the groups that received loans are no more efficient than groups that did not receive loans; however, it is not clear the loans would increase efficiency, so those results are not presented here.*

Figure 2. Average Revenues, Expenditures, and Profits, Households in the UDOP Trial, by type of credit, Nganjuk Regency, Indonesia, 2022

Somewhat surprisingly, average revenues are a bit lower among the credit group than the control group (Figure 2), though the difference is not statistically significant. Average profits, therefore, are a bit lower among the credit group than the control group, given differences in input expenditures. As with the levels of input expenditures, revenues and profits are substantially higher than for rice farmers in the PT MDP trial; average profits across the data set are around $3000.

The shallot farmers paid back loans quite quickly; in this case, the off-taker (UDOP) paid PT MAL back in full even slightly before they received product from all the credit farmers. So although it is fairly clear the loans did not have an impact on their expenditure levels, revenues, or profits, in this context the AVCF scheme worked as it was supposed to work; the off-taker ensured loans were paid back. Since it was not as clear the need was evident for partial loans, the project moved to one additional trial among vegetable farmers.

KPH (Malang Regency, Vegetables)

The final pilot trial took place among vegetable farmers in Malang Regency that were part of the KPH vegetable cooperative. Similar to the shallot trial, credit was only meant to partially cover total input costs, as input costs are substantial for growing vegetables. The surveys again took place post-trial, and in this case included 19 farmers who received PT MAL credit, and 25 farmers who did not.

As with the other two trials, we first illustrate average input and labour expenditures by group, and then revenues and profits (Figure 3). We again find substantially lower input expenditures among the credit group than the control group, but labour expenditures appear slightly higher. The total expenditures are much higher than for rice, but lower than found among the shallot farmers in Nganjuk. Revenues and profits are about equal across the two groups, fitting with the findings on revenues and expenditures. As with the other two pilots, as the credit offers were not randomized, any differences here are not necessarily attributable to the credit provision.

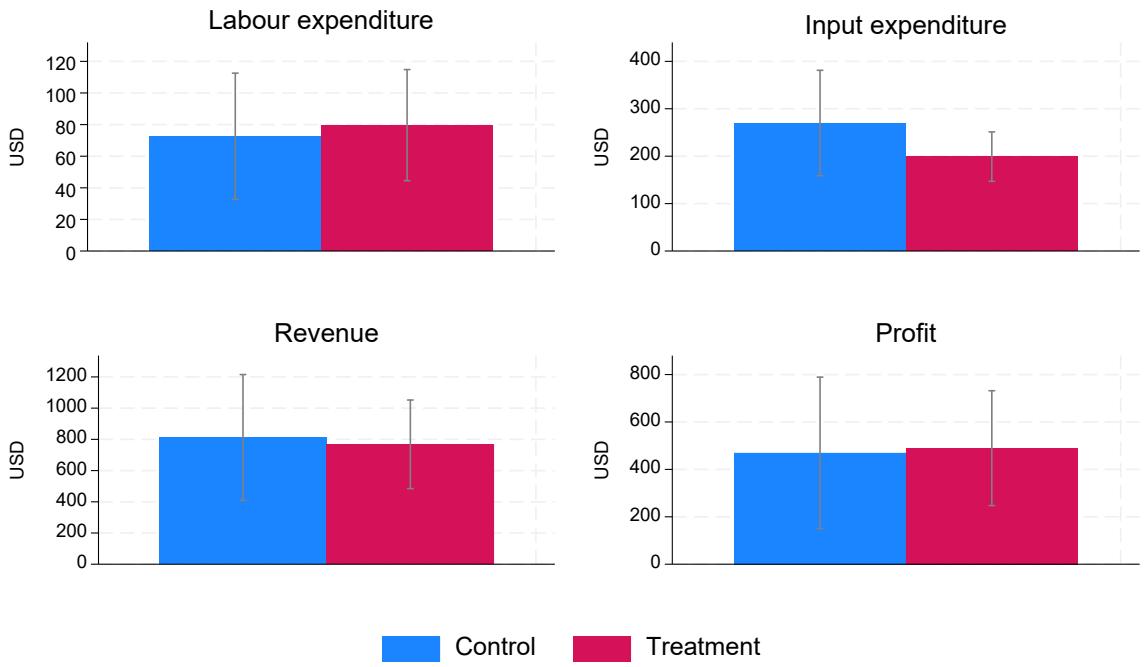


Figure 3. Average Revenues, Expenditures, and Profits, Households in the KPH Trial, by type of credit, Malang Regency, Indonesia, 2023

Finally, there were repayment challenges; because of the large investments required in vegetable farming, households in the cooperative had a hard time setting aside the cash to pay back loans during the project. They in general had expected higher prices for their vegetables; note the average profit levels are roughly equal to required expenditures to grow vegetables. These farmers are clearly in need of a method of overcoming their liquidity constraints, but could not do so during the 2023 growing seasons.

7.1.4 Gender in Agriculture and Finance

As noted above, a study on gender in agriculture and finance was conducted in 2023 to learn more details about women's participation in agriculture, in agricultural finance decisions, and in financial decisions in general among households. Within agricultural participation, the survey questionnaire delineated different tasks conducted by households, so we can learn about how women and men differentially complete specific components of production. The survey was conducted in 602 households in six provinces; in each province one regency was selected in the lowlands and one in the highlands, and so in each province one regency was rice-growing, and the other was dominated by potato or vegetable farming (Table 7). We include the questionnaire in Appendix D.2.

Table 7. Provinces and Regencies included in Gender Study, Indonesia, 2023

Province	Lowland Regency	Highland regency (crop)
North Sumatra	Simalungun	Karo (vegetables)
West Java	Majalengka	Garut (vegetables)
Central Java	Klaten	Wonosobo (potato)
East Java	Nganjuk	Malang (vegetables)
Bali	Karangasem	Tabanan (vegetables, flowers)
West Nusa Tanggara	Central Lombok	East Lombok (potato)

We first examine reported shares of husbands and wives participating in both household financial decisions and agricultural financial decisions (Figure 4). Wives typically participate in decisions about household finance (left panel), but there is quite a bit of heterogeneity in how often husbands participate. In West Java, only 10 percent of husbands participate in household day-to-day financial decisions, but over half do so in neighboring Central Java. Wives almost always participate in decisions about day-to-day household finances.

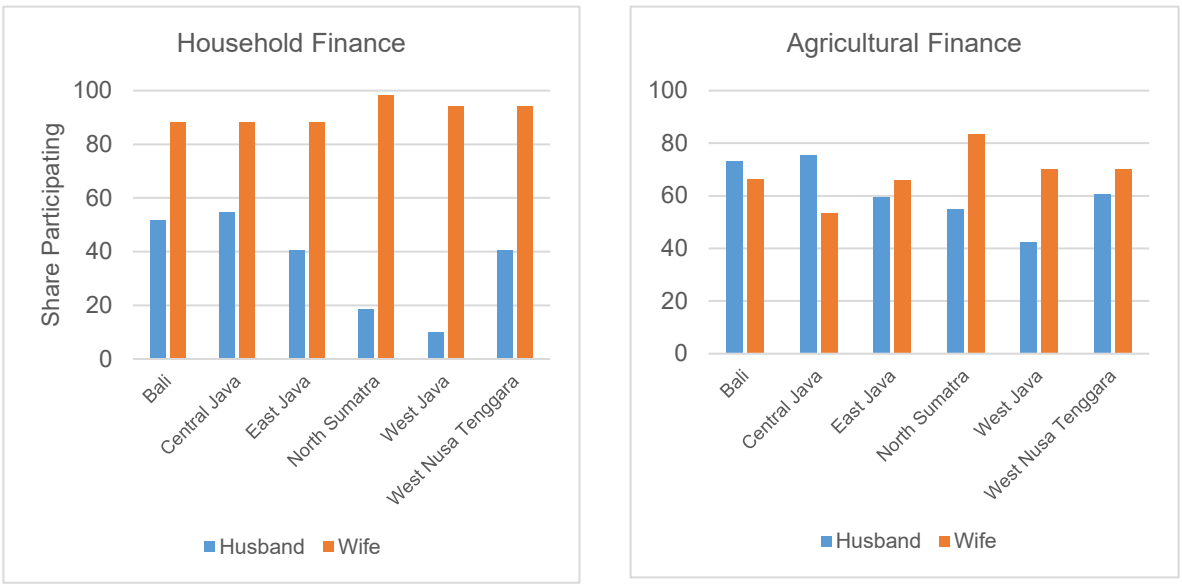


Figure 4. Participation in decisions about Household and Agricultural Finance, Indonesia, 2023

Meanwhile we observe quite a bit of heterogeneity among both husbands and wives for agricultural finance decisions (right panel). Husbands participate in these decisions between 70 and 75 percent of the time in Bali and Central Java, but only 40 percent of the time in West Java. Meanwhile, wives participate in over 80 percent of decision making in North Sumatra, but only half in Central Java. Beyond this spatial heterogeneity, a second interesting component of this finding is that women generally participate in these decisions. This finding is notable, given research in other majority Muslim countries (e.g. Baeshen, Girardone, and Sarkisyan, 2023).

Agricultural Labour

The survey does not just reveal variation in participation in financial decisions across Indonesia's provinces; it also included a set of task-based questions about agricultural labour participation, following de Brauw, Kramer, and Murphy (2023). As with financial decisions, we find heterogeneity across provinces in female agricultural labour participation (Figure 5). As with financial decisions in agriculture, North Sumatra has the highest participation rate, at 64 percent. Meanwhile, the participation rate in East Java is only 39 percent, implying a 25-percentage point discrepancy. Given that we are averaging across both lowlands (rice) and highlands (horticulture) and measuring across all potential tasks, this difference is quite large.

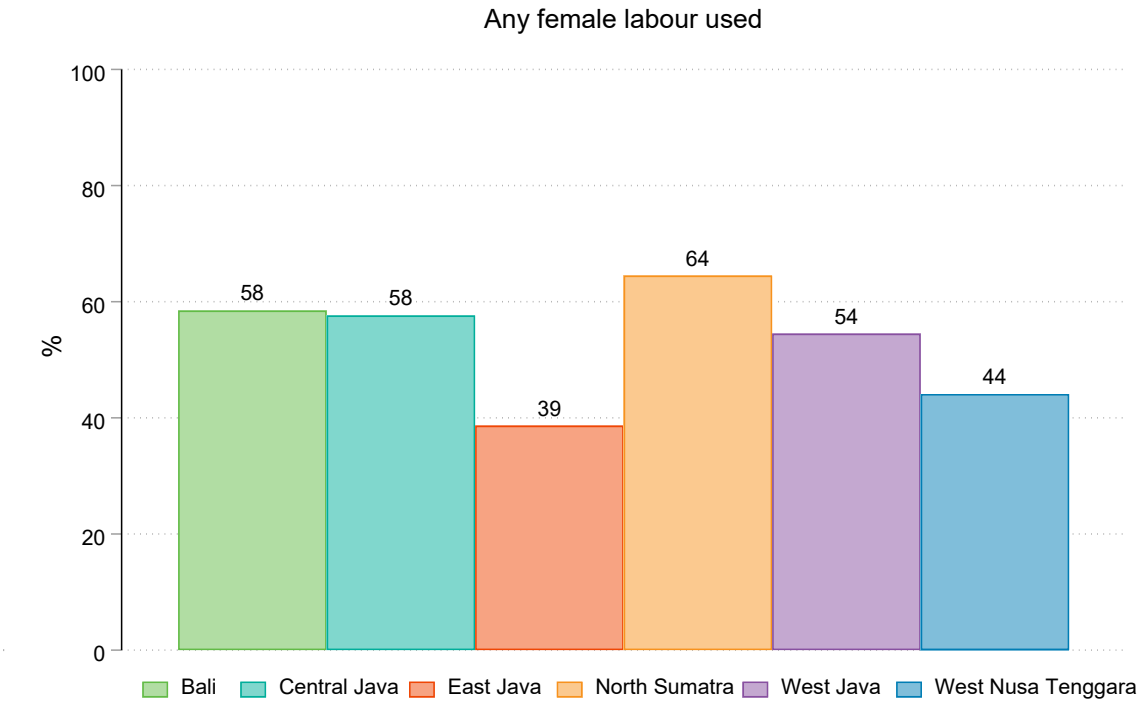


Figure 5. Share of households reporting any female labour use, by province

We next explore the questions asking about the gender of labourers by task, and by highland and lowland areas (Figure 6).[20] We observe some notable differences between the tasks conducted by women by location or crop type. In both highlands and lowlands, women are substantially involved in planting, weeding, and harvesting. There are clearly tasks that women participate in for vegetable farming that they do not do in rice farming. For example, they are often involved in tilling and fertilizing fields in the highlands, but not often in the rice growing lowlands. They are also involved in cleaning highland crops after harvest, but not rice in the lowlands; however, women are more often participating in drying rice as vegetables are

[20] *In Appendix A.7, we include this figure and Figure 8 by type of crop instead of location, and the numbers are virtually the same, as there are only a small number of rice farmers in the highlands.*

typically sold fresh rather than being dried locally. Women are not typically involved in dealing with pests for either crop, and only rarely are they involved in transport.

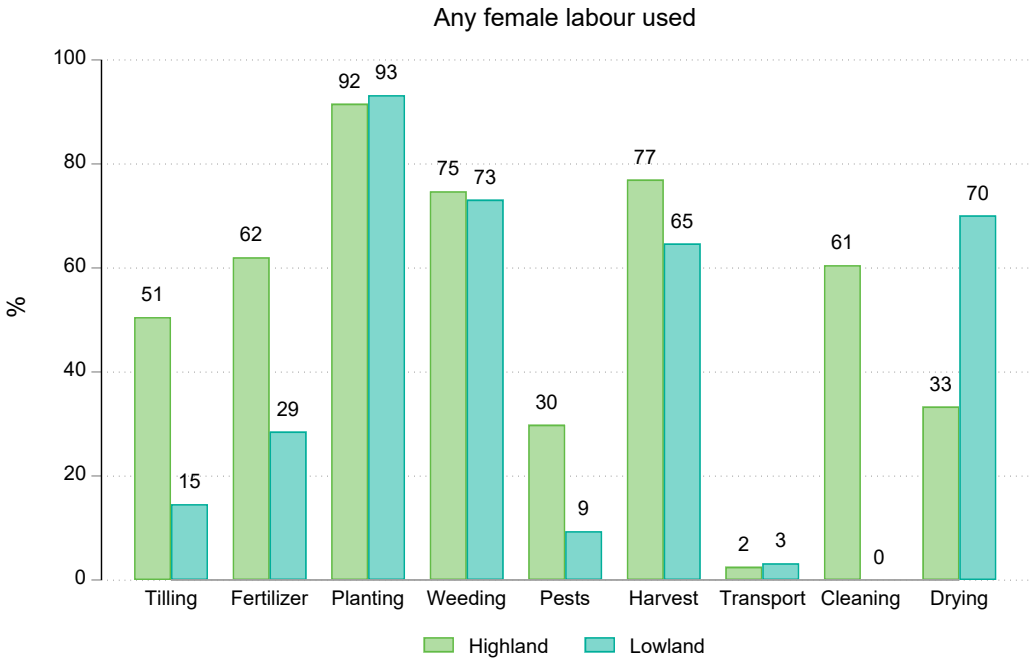


Figure 6. Percent of Households using Female Labour, by Task and Location (Highland/Lowland), Gender in Agriculture and Finance Survey, 2023

In addition to considering the extent to which female labourers have any involvement by task, we explore the intensive margin, or the share of total hours worked by women. Overall, women were responsible for slightly more than a third of total labour hours across the sample, with similar shares in highland and lowland areas. However, there is substantial variation in the share of farm labour hours performed by women by province, ranging from as low as 23% in East Java to over half (52%) in North Sumatra (Figure 7).

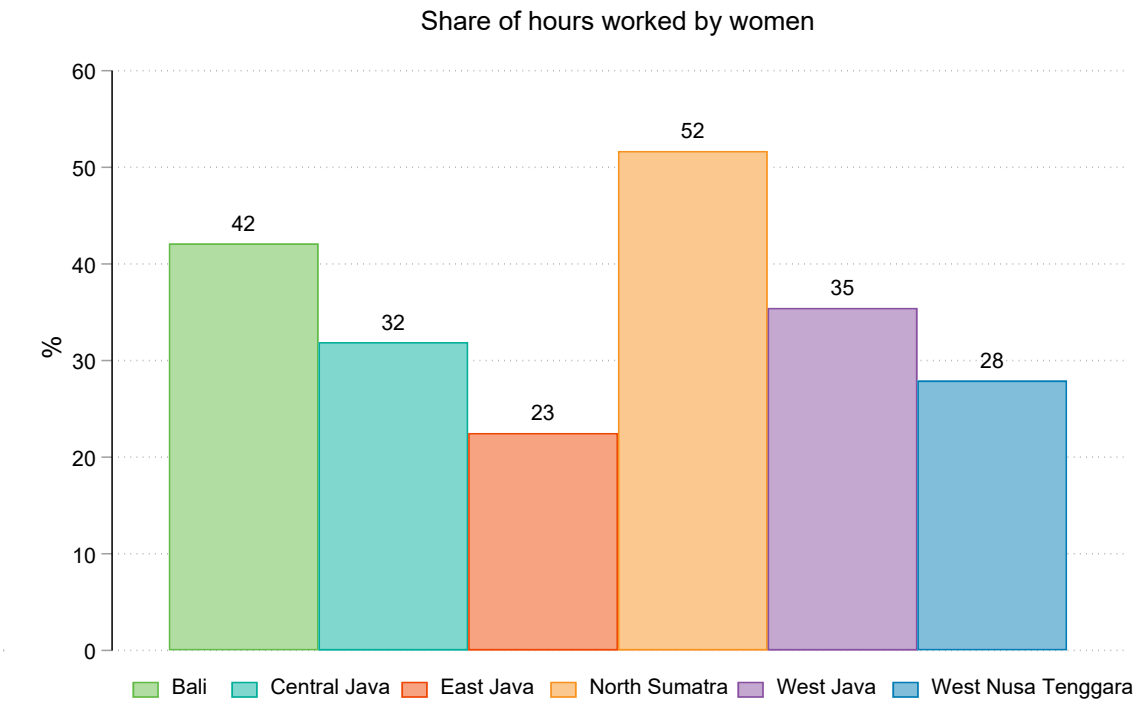


Figure 7. Share of Overall Hours worked by female labourers by province, Gender in Agriculture and Finance Survey, 2023

If we disaggregate the share of hours worked by women by task, we find that for most tasks men provide the majority of labour (Figure 8). In both highlands and lowlands, weeding is split almost evenly by gender overall; similarly, harvest is split nearly evenly by gender with 48 percent of harvest hours done by women in the highlands and 45 percent of hours in the lowlands. As when examining whether women participate in tasks or not, we find some interesting heterogeneity between lowlands and highlands; for example, women typically spend more hours on tasks than men in highland agriculture, with the exception of drying crops; when crops are dried, women participate more in drying rice.

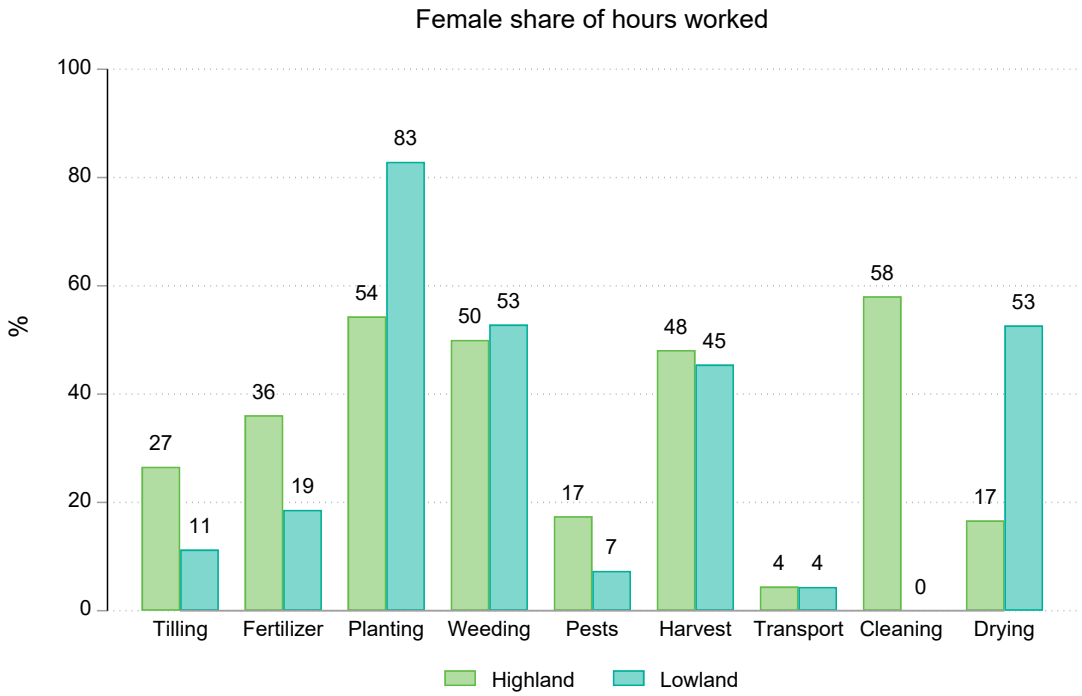


Figure 8. Share of Hours worked by Women, by Task and Location, Gender in Agriculture and Finance Survey, 2023

This heterogeneity does not appear to be driven by variation in observable farm characteristics by province (Table 8). We regress female labour share by task, prior to post-harvest, on a series of indicator variables designating lowland areas (with highlands as the omitted category) and province (with Central Java as the omitted category), controlling for household head type, household size, and cultivated area.[21] We observe statistically significant variation in the female share of overall hours worked across tasks, for both lowland areas and across provinces. This result illustrates the considerable heterogeneity within the sample area, which is an important consideration for the design of gender sensitive future interventions.

[21] *The post-harvest variables had a substantial amount of missing data, suggesting that households did not conduct those tasks.*

Table 8. Regression of Female Labour Share on Location Characteristics, by Task, Indonesia

	Tilling	Fertilizer	Planting	Weeding	Pesticide	Harvest
	(1)	(2)	(3)	(4)	(5)	(6)
Is lowland?	-0.132***	-0.171***	0.273***	0.0509	-0.0924***	-0.0186
	(0.0284)	(0.0272)	(0.0251)	(0.0321)	(0.0239)	(0.0288)
Provinces						
Bali	0.0651	0.210***	-0.0680	0.0446	0.108***	0.130***
	(0.0503)	(0.0455)	(0.0477)	(0.0557)	(0.0415)	(0.0471)
East Java	-0.148	-0.0790	-0.126	-0.146**	-0.105**	-0.0225
	(0.103)	(0.0574)	(0.123)	(0.0681)	(0.0497)	(0.0961)
North Sumatra	0.286***	0.276***	0.155***	0.269***	0.105***	0.0673
	(0.0479)	(0.0458)	(0.0473)	(0.0548)	(0.0398)	(0.0512)
West Java	0.0112	0.0427	0.181***	0.130***	-0.0785**	0.0797*
	(0.0412)	(0.0420)	(0.0442)	(0.0503)	(0.0364)	(0.0428)
West Nusa Tenggara	-0.0821*	-0.0504	0.113**	-0.0230	-0.109***	-0.0688
	(0.0456)	(0.0451)	(0.0468)	(0.0536)	(0.0390)	(0.0474)
Number of obs.	425	586	509	567	545	413

Notes: Ordinary least squares regression with standard errors in parenthesis. *, **, *** indicate significance at the 10%,5%, and 1% levels respectively. Estimates are relative to Central Java. Unreported controls include household size, gender of household head, and cultivated area. Missing values suggest that households did not report upon that type of labour.

We finally examine reported daily wages among hired labour by gender and by province (Figure 9). Average wages are always higher for men than for women. In most cases, the error bars indicating a confidence interval around the mean do not overlap, suggesting that the difference is statistically significant. The differences could reflect differences in task allocations between genders, differences in productivity, and gender discrimination, among other explanations.

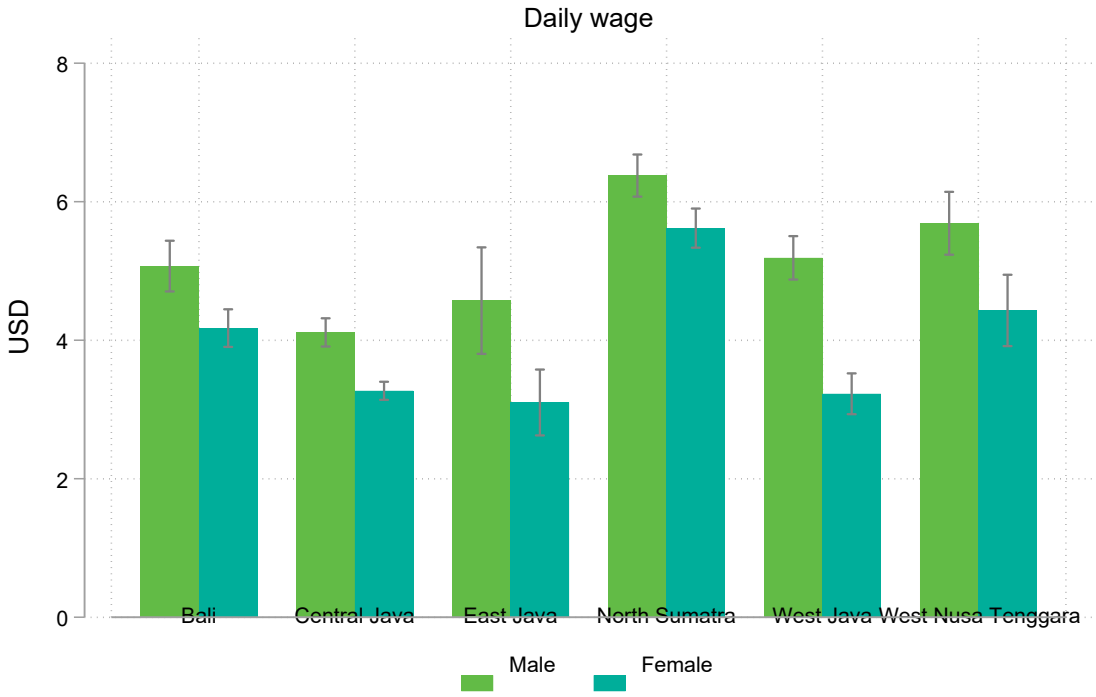


Figure 9. Average Daily Wage, by Gender and Province, Gender in Agriculture and Finance Survey, 2023

Summary

The survey on gender, finance, and agricultural practices lead to a number of different insights about future policy design. First, we find that women are quite involved in agricultural finance decisions, though there is some heterogeneity across provinces. In some provinces, such as North Sumatra, agricultural finance messages should probably be tailored to women, given their substantial role in decision making. We also find heterogeneity in women's participation in agriculture by task; controlling for province, women are less likely to do pre-planting tasks and to spread pesticides, but are more likely to plant relative to the highlands. Meanwhile, in North Sumatra, women are more likely in general to conduct agricultural tasks, while in West Java they are more likely to plant and weed, but less likely to spread pesticides. These findings can again help the government consider how to target interventions on improving agricultural practices.

7.2 Myanmar

As discussed above, project activities in Myanmar were curtailed first by the COVID-19 pandemic and then by the military coup in 2021. We provide a brief discussion of findings from the country report, as their relevance has changed, and then we describe findings from a small pilot project conducted in 2019 and 2020.

7.2.1 Findings from the Country Report

The country report (Basu et al., 2020) suggested the following policy recommendations:

- Encourage commercial banks and MFIs to engage in value chain financing by helping them to deepen their understanding of AVCF and AVCF concepts. Regulators should develop an appreciation of AVCF as a risk-reduction strategy.
- Explicitly consider the implications of agricultural financing policies for women and other underserved groups.
- While promoting the emerging insurance industry for important commercial applications such as trade and large-scale agriculture, carefully consider the commercial viability of microinsurance schemes marketed to individual farmers. Consider piloting alternative models such as group microinsurance.
- Focus on government intervention to address credit market failures, moving line ministries away from direct delivery of financing programs, and removing distortionary subsidies provided by state-owned financial institutions.
- Continue to heavily encourage capacity building for lending institutions in areas such as risk assessment and underwriting, and the capacity of regulators to assess these capacities in the lending institutions, so that artificial limits on interest rates can continue to be gradually removed.

7.2.2 Pilot Project

The pilot project described above was implemented with two distinct, but complimentary, research approaches. The first approach was an evaluation of a novel credit-scoring approach which leveraged phone metadata to automate scoring. The objective was to explore whether this method could generate reliable assessments of default risk, without the verification costs required by traditional assessments. The second component randomized some access to credit. Farmers were recruited from villages near existing BRAC branches in the East Bago region of south-central Myanmar. Farmers who had been through a light screen for credit worthiness were randomly selected from twelve village tracts in the study area, with 432 farmers participating in the main study. They were then randomized into a group that automatically received loans, and a group that went through the standard loan application process.

After the trial began, the research team obtained an automated credit score used for targeting loans that had been generated automatically through a proprietary algorithm for each farmer, using mobile telephone metadata.[22] The phone usage period studied by the algorithm was contemporaneous with the pilot project. The first component of the research involves the automated score, first studying its correlates and attempting to understand whether it is related to default. The second research component examines the impacts of credit on outcomes among farmers, using a difference-in difference approach. The automated and traditional loan recipients are combined in analysis. To adjust for potential bias, each farmer obtaining automated credit is matched with three nearest neighbours from within the control group in analysis, using propensity scores.

Assessing the Automated Credit Score

First, the study regresses the credit score on several variables intended to capture key farmer characteristics and behaviours related to credit access.[23] First, the credit score is regressed on variables measuring financial behaviours (Table 9). The regression finds a negative, statistically significant correlation between the score and both an indicator for having taken a loan in the previous 12 months, and an indicator for holding formal savings. The result suggests farmers receiving higher credit scores are relatively less likely to have either loans or formal savings. They mighty benefit from this credit scoring system relative to traditional financial approaches. There is also a positive, statistically significant positive correlation between the credit score and the amount of loans held, though the average farmer has less than one loan.

Table 9. Correlation between generated credit score and financial behaviour, Myanmar BRAC Pilot

	Credit Score
Loan taken in last 12 months	-50.178***
	(17.579)
Holds formal savings	-38.623***
	(11.392)
Number of loans taken (last 12 months)	23.144*
	(13.236)
Total loan amount (USD)	0.0255***
	(0.006)
Loan interest rate	0.164
	(3.599)
Agricultural input loan	10.678
	(13.887)
Engaged in self-employed business	17.358
	(14.33)
Has business bank account	11.631
	(15.862)
Observations	291
R-squared	0.135
Village FE	Yes

Notes: Ordinary least squares with standard errors in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively.

[22] *Unfortunately, neither the algorithm nor any information about its components were made available to the research team.*

[23] *For more details on the pilot project, see Oo et al. (2024).*

Perhaps the most interesting result is that there is no correlation between the score and reported delinquency, providing suggestive evidence that the algorithm may need to be adjusted to adequately capture risk of default before being used for credit decisions in this context.[24] There does appear to be a positive correlation between the score and the total amount the farmer has borrowed, but it is not clear how that information would help credit scoring. Though the results are not reported here, there are no significant correlations between either farmers' demographic and educational characteristics, or their land holdings and input expenditures for the previous season.

Next, the analysis examines correlations between the credit score and measures of social networks (Table 10). There is a statistically significant and positive relationship between leadership in community groups and the credit score. This result suggests that individuals who are more central within local social networks are more likely to receive a higher automated credit score. A potential explanation is that leaders may be more active in their communications or in contact with a broader range of individuals via mobile phone within these communities, providing a richer set of metadata for the algorithm to train on. However, the coefficient might also reflect latent factors related to wealth, if group leaders have more assets on average than other individuals within the community.

Table 10. Correlation between Credit Score and Social Networks, Myanmar

	Credit Score
Has social support	-28.746
	(13.767)
Number of community groups	-2.999
	(10.38)
Position as leader in community groups	37.845***
	(12.919)
Any communal activities (last month)	-1.033
	(22.766)
Observations	230
R-squared	0.098
Village FE	Yes

Notes: Ordinary least squares with standard errors in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively.

Overall, the pilot finds some evidence to suggest that the credit scoring algorithm may capture some aspects of individual financial characteristics, but further research would be necessary with a larger sample to understand the robustness of these relationships and whether they remain stable over time. The algorithm would also have to be modified to better capture default risk before being deployed in a commercial setting.

Difference-in-Difference Results

For the second component, the approach is to use a two-period difference-in-differences regression to assess the effect of obtaining a loan on input use, credit outcomes, output, and other income. In the following tables, the interaction term "Treatment x Endline" can be interpreted as the difference in outcomes between households receiving loans and those that did not.

[24] *This result is reported in Appendix Table A.8.*

First, we examine the effect of receiving loans on agricultural input use (Table 11). presents the first group of these results for agricultural inputs.[25] In general, there are no statistically significant differences in either land allocation or expenditures between treatment and control groups. The exception is for ploughing, where reported expenditures are slightly lower for the treatment group ($p < 0.05$). However, the statistical significance is not likely to survive a potential adjustment for multiple hypothesis testing.

Table 11. Difference-in-Difference Estimates for Impact of Receiving Loans on Agricultural Input Use, Myanmar

		Area planted	Labour days	Seed	Ploughing	Fertilizer	Pesticides	Total cost
Treatment x Endline		-0.085	-0.236	-0.061	-0.389**	0.13	-0.033	-0.086
		(0.099)	(0.211)	(0.212	(0.191	(0.23)	(0.21)	(0.198)
Endline		0.041	0.094	0.069	0.237*	-0.198	-0.033	-0.091
		(0.078)	(0.163)	(0.173	(0.136	(0.201)	(0.163)	(0.155)
Treatment		-0.281*	0.049	-0.017	0.236	-0.131	0.079	0.02
		(0.151)	(0.153)	(0.177	(0.161	(0.201)	(0.192)	(0.205)
Observations		1311	1311	1287	1301	1230	1247	1224
Effective observations		377	377	372	374	365	360	359
Village FE		Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Ordinary least squares with standard errors in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively. “Effective observations” refers to the number of observations remaining excluding cases where explanatory variables are perfectly correlated with village fixed effects.

Next, we consider the results for financial outcomes (Table 12). The treatment increased loan uptake on the extensive margin, with treated individuals taking up more loans than those in the control group subject to a traditional screening process. The amount of each loan was comparable between the two groups, so treated individuals did not increase the amount of credit for a given loan, but rather more individual loans were taken up, suggesting there is some unmet demand for credit among some farmers. Treated farmers reported higher savings on hand at endline, reflecting their increased access to liquidity.

Table 12. Difference-in-Difference Estimates for Impact of Receiving Loans on Credit and Savings Outcomes, Myanmar

	Number of loans	Loan amount	Savings amount
Treatment x Endline	1.598***	-0.239	0.749***
	(0.257)	(0.178)	(0.224)
Endline	-1.400***	0.138	-0.754***
	(0.22)	(0.088)	(0.163)
Treatment	-0.054	0.692***	0.259*
	(0.148)	(0.141)	(0.143)
Observations	985	963	968
Effective observations	299	292	294
Village FE	Yes	Yes	Yes

Notes: Ordinary least squares with standard errors in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively. “Effective observations” refers to the number of observations remaining excluding cases where explanatory variables are perfectly correlated with village fixed effects.

[25] The number of observations in regressions found in Tables 11 through 14 include the household receiving the loan and all matched households (up to 3). To clarify, we also list the effective observations, which is the actual number of households included in the regression.

The analysis next explores the effects of the treatment on agricultural outcomes and on income from other sources, in Table 13 and Table 14, respectively. Access to these loans did not affect agricultural outcomes in the most recent season (Table 13). The coefficients for the treatment interaction are not statistically significant, suggesting no difference in outcomes between treated and control individuals, reflecting the results for agricultural inputs. In terms of other income sources (Table 14), treated farmers report no statistically significant differences for investment or returns for their own small businesses. For income from salaries, there is a marginally significant ($p < 0.1$) and negative difference for the treatment group, though treated individuals also reported higher salaries at baseline, suggesting this result may reflect mean reversion. For casual income, treated individuals report higher levels of income than control farmers that are statistically significant ($p<0.05$), providing some evidence that reducing constraints to access credit may enable individuals to have sufficient security to increase their off-farm income.

Table 13. Difference-in-Difference Estimates for Impacts of Loans on Agricultural Output, Myanmar

	Crop revenue	Crop profit	Livestock revenue	Crop yield
Treatment x Endline	-0.186	-0.18	0.183	-0.252
	(0.187)	(0.236)	(0.176)	(0.165)
Endline	0.052	0.148	0.014	0.047
	(0.16)	(0.208)	(0.121)	(0.137)
Treatment	-0.07	-0.154	0.154	0.004
	(0.151)	(0.169)	(0.137)	(0.139)
Observations	1194	1209	1143	1305
Effective observations	353	355	337	377
Village FE	Yes	Yes	Yes	Yes

Notes: Ordinary least squares with standard errors in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively. “Effective observations” refers to the number of observations remaining excluding cases where explanatory variables are perfectly correlated with village fixed effects.

Table 14. Difference-in-Difference Estimates for Impacts of Loans on Other Income Sources, Myanmar

	Own business investment	Own business profit	Salary income	Casual income
Treatment x Endline	-0.047	0.183	-0.415*	0.493**
	(0.257)	(0.218)	-0.224	-0.227
Endline	-0.117	-0.074	0.208	-0.305
	(0.227)	(0.178)	-0.191	-0.19
Treatment	0.172	0.032	0.344*	-0.178
	(0.177)	(0.176)	-0.181	-0.175
Observations	1141	1140	1130	1143
Effective observations	337	334	335	337
R-squared	0.125	0.198	0.684	0.203
Village FE	Yes	Yes	Yes	Yes

Notes: Ordinary least squares with standard errors in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively. “Effective observations” refers to the number of observations remaining excluding cases where explanatory variables are perfectly correlated with village fixed effects.

Overall, this analysis does not find evidence that the automated scoring mechanism reflects the risk of default; it did not predict default well. It seems likely that improved automated

scoring mechanisms are needed. It then finds that loans had muted impacts on input use and no impacts on agricultural output relative to the control group. This finding may either reflect that this pilot was small and therefore has low statistical power. However, the fact that we do not observe differences in input use between loan recipients and the control group suggests that farmers could find other sources of money to purchase required inputs.

7.3 Vietnam

As noted in the methodology section, Vietnam is the only country in which we could conduct a randomized control trial in the second phase, as planned in the project proposal. Hence in this section after we describe findings from the country report, we describe the randomized control trial results in the second component.

7.3.1 Findings from the Country Report

The country report found that two main types of policy changes could be helpful for agricultural value chain finance to progress. The first type of change relates to finance policy, and second, we discuss changes related to agricultural value chain finance specifically.

- From the perspective of general finance, consider allowing banks further freedom in agricultural lending, both in terms of interest rates and credit amounts. Fixed interest rates—particularly when subsidized—lead to credit rationing, which reduces the amount of credit available to lower-income farmers. When ceilings bind on loan amounts, they also hinder the amount of investment that can take place.
- Digitize information about plots including but not limited to land use rights (red book) certificates. The goal from a value chain finance perspective is to ensure that the process of using the red book certificates as collateral can be streamlined. Smallholders and banks find the transaction costs to smallholder lending high; ensuring that more farmers can use an already acceptable form of collateral can facilitate financial flows from both traditional and nontraditional lenders. Ideally this information can be made publicly available.
- Digitization of plot information would help develop collateral for Vietnamese smallholders to help foster lending to them. Alternative forms of collateral, such as warehouse receipts, should also be made legally acceptable. While Decree 57 alludes to a need for warehouses for crops, there is no provision for a warehouse receipt system. We suggest finding ways to develop laws to legalize such alternative forms of collateral.
- Foster the development of business skills among farmer groups, particularly in high potential areas. A relatively cost-effective method of doing so could be to develop “rules of thumb” related to business practices in value chains to facilitate widespread promotion. Increasing the business skills of farmers or groups of farmers can facilitate value chain development. This recommendation also emerged from an analysis of Decree 57 (Ancev, et al., 2019).

7.3.2 Pilot Project

The pilot project is well described in section 5.3.3. This section proceeds by initially describing the baseline data collection and baseline results, and then describes the endline data collection and endline results.

Baseline Data and Results

Baseline data for the pilot project were collected among 978 farm households in Son La in August 2022. Farmers were randomized into one of four treatment groups or the control group; recall, the initial randomization offered two different loan types (described in Appendix Tables A.4 and A.5), and the loan type was cross randomized with whether the listed farmer or the

farmer and his wife were invited to the information sessions. After the initial information sessions yielded very few loans, the four treatment groups were collapsed into one group for the second set of information sessions. Therefore, rather than testing for balance among all four treatment groups, we simplify the analysis here and measure differences by treatment group; e.g. households that were offered loans versus those that were not. The randomization took place among households, so within villages some households or farmers were offered loans, whereas they were not in the control groups.

We provide some selected basic descriptive statistics for households in Table 15. Households on average have about 4.5 members, of whom 1.4 are children. Just over 90 percent of household heads are literature, and similarly about 92 percent are male. Few households have access to off farm work; only 18 percent of households report having an adult who works off-farm.

Table 15. Selected Descriptive Statistics for Baseline Sample, Son La Province, Vietnam, 2022

Variable	Full Sample	Those offered Loans	Control group	P-value
Household Size	4.537	4.498	4.576	0.414
	(0.047)	(0.065)	(0.070)	
Number of Children	1.391	1.395	1.386	0.872
	(0.030)	(0.042)	(0.044)	
Head is literate?	0.916	0.916	0.916	0.985
	(0.009)	(0.013)	(0.013)	
Head is male?	0.926	0.926	0.927	0.986
	(0.008)	(0.012)	(0.012)	
Adult has non-farm job	0.184	0.189	0.180	0.719
	(0.012)	(0.018)	(0.017)	
Household has red book	0.660	0.639	0.680	0.185
	(0.015)	(0.022)	(0.021)	
Coffee area (m^2)	3737	3756	3719	0.877
	(120)	(172)	(167)	
Rice area (m^2)	236.8	238.3	235.4	0.883
	(10.0)	(15.8)	(12.3)	
Flush toilet?	0.703	0.695	0.712	0.548
	(0.015)	(0.021)	(0.020)	
Refrigerator?	0.817	0.816	0.818	0.910
	(0.012)	(0.018)	(0.017)	
Color TV?	0.829	0.818	0.841	0.336
	(0.012)	(0.017)	(0.017)	

Notes: 978 observations in total; 488 in the treatment group, and 490 in the control group. Standard errors in parentheses. P-value for the test that the mean of the treatment group is equal to the mean of the control group.

Turning to their land access, about two thirds of the sample have the red book for their land, which acts as the certificate that they have rights to use their land (Table 15). They hold about 0.37 hectares of coffee on average and the amount of land they farm in rice is much smaller (237 square meters on average). These statistics are broadly consistent with a shift from maize farming to coffee cultivation that took place around the turn of the century in these villages. This shift broadly helped increase the living standards in the area. All households have electricity; 70 percent have flush toilets, and over 80 percent report owning refrigerators and colour televisions, respectively.

In Table 15, we also examine whether households who were offered loans appear at all different, on average, than households that were not offered loans. The averages of each of those characteristics discussed above are listed by group in columns 2 and 3, and the p-value associated with the hypothesis that both means are equal is in column 4. None of the p-values are particularly small, so there is no concern, at least based on these variables, that the randomization left some important observable or unobservable differences broadly between the two groups.

We next examine two quite basic measures of personal characteristics that can affect whether individuals would be interested in loans or not—a measure of willingness to take risks, and a measure of impatience. People who are less willing to take risks would be less likely to want to take on loans; hence, we are interested in when individuals self-report a lower risk tolerance. Similarly, we might think that people who consider themselves less patient would be less likely to take on loans.

We provide a simple histogram of answers to each question (Figures 10 and 11), with higher numbered answers suggesting a higher level of the trait. The most frequently mentioned answer is 5, which can be taken to mean that either the respondent did not think they were any more or less risk tolerant or impatient than other farmers. Nonetheless, for both measures, we observe a higher proportion of individuals claiming they are more risk tolerant than the median, and more patient than the middle of the distribution. These answers would appear to suggest that at least along the lines of self-reports, neither risk tolerance nor impatience should affect household willingness to take on loans.

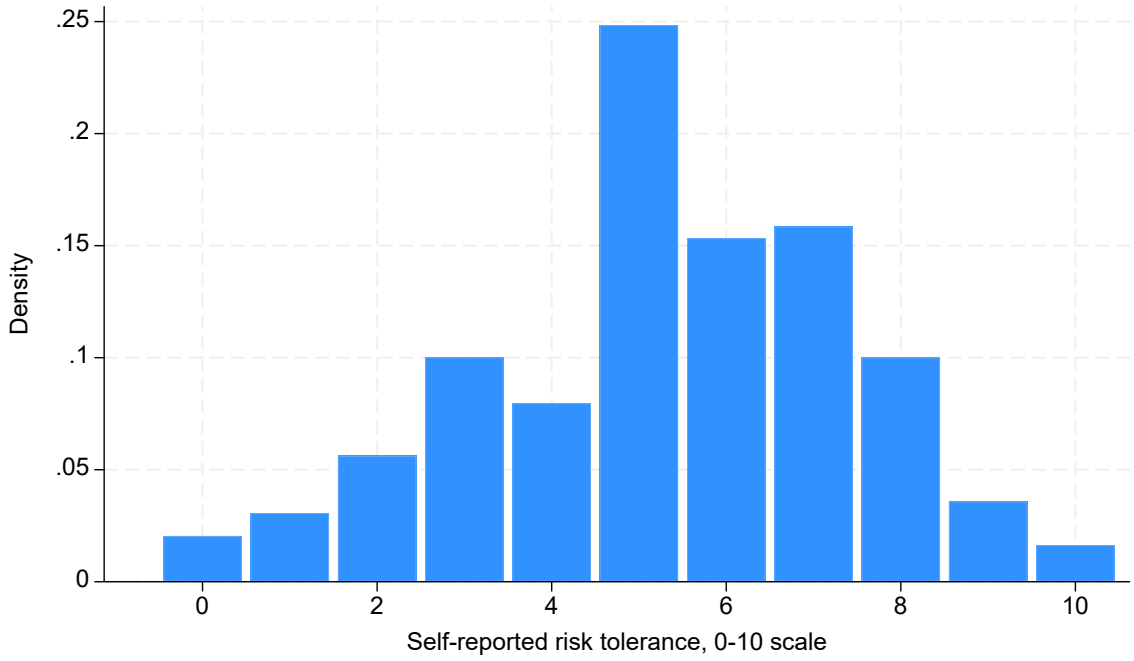


Figure 10. Self-Reported Risk Tolerance, Coffee farmers, Son La Province, Vietnam, 2022

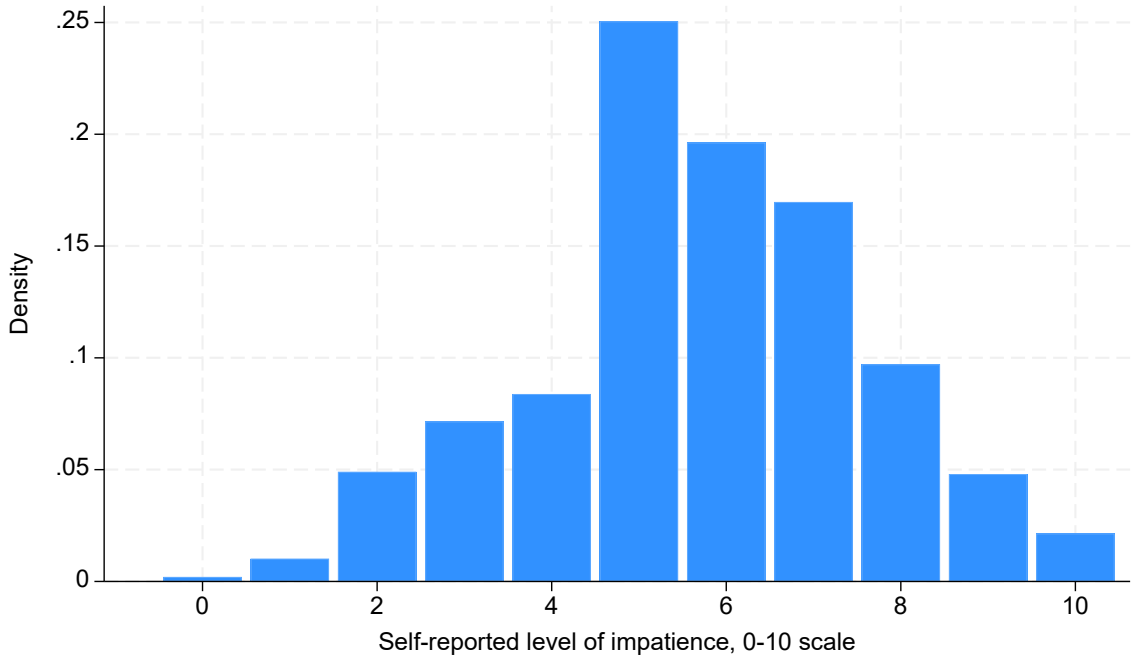


Figure 11. Self-Reported Level of Impatience, Coffee farmers, Son La Province, Vietnam, 2022

We next turn to describing the loans that were reported at baseline. Somewhat surprisingly, few households did not report having many outstanding loans. Within the baseline sample, only 21 percent of households report having an outstanding loan for coffee. Few households reported other types of outstanding loans as well; only 17 percent of households reported loans other than coffee loans. In general, we observe that households do not have a large amount of outstanding credit at baseline.

Coffee Production at Baseline

The next question relates to coffee production; we want to measure coffee production, yields, and sown area among baseline households; since the households were randomized into treatment and control groups, we should not observe statistically significant differences between households that were randomized into one of the treatment groups versus the control group. We therefore measure the average coffee production, sown area in coffee, and yields, by simple treatment status (Table 16). Average coffee production is just over 12 tons among both the treatment and control group farmers; the difference between the two averages is not significant. The average coffee area for both groups is quite similar, at 0.37 hectares; since production is higher among the control group, the average yield among the control group is a bit higher, though the difference is not statistically significant.

Table 16. Average Coffee production, prices, and input use, by Treatment Status, Son La, Vietnam, 2022

	Treatment Group	Control Group
Production (kg)	12431	12940
	(460)	(473)
Area (m^2)	3756	3719
	(172)	(168)
Yield (T/ha)	1.17	1.23
	(0.06)	(0.06)
Average median price (thousand VND/kg)	16.76	17.25
	(0.43)	(0.44)
Total Value, Production (million VND)	201.3	211.8
	(8.6)	(8.4)
Household Labour Days	379.9	404.5
	(12.2)	(14.8)
Hired Labour Days	73.1	75.5
	(5.0)	(6.0)
Total Costs (including inputs; million VND)	42.4	43.0
	(1.6)	(1.8)

Notes: Standard errors in parentheses.

We then examine prices paid for coffee and total revenue or the total value of production (rows 4 and 5). We do not observe a difference in the average median price paid; recall, we asked farmers about their three largest transactions, so this price would reflect the median among those prices. The average price paid to farmers per kilogram is around 17,000 Vietnamese dong, which is around US$0.66/kg at current exchange rates. The estimated total value of production (median price times total production) is just over 200 million Vietnamese dong for both groups; these figures are just under US$8,000, so farm revenues from coffee are quite substantial at baseline.

The final set of outcomes relate to labour and input use. The survey form asked about labour use by activity and by hired or family labour, so here we aggregate the family or household labour days, sum the hired labour days, and report on the value of all spending on inputs, including hired labour (rows 6-8). Control group households appear to use a bit more household labour than treated households (row 6), at 404 days versus 380 days. Both groups appear to hire about 75 days of labour over the season, and total input costs are around 43 million dong. There do not appear to be differences by treatment group in the latter two variables.

To check whether the production distributions actually differ, we next graph the logarithm of coffee production, by treatment status (Figure 12). We find the distributions overlap one another quite nicely. There is a small amount of additional density right around the peak of the distribution among the treatment group, with slightly more density among households with high production among the control group; however, these differences visually appear quite small. The two distributions do not appear very different.

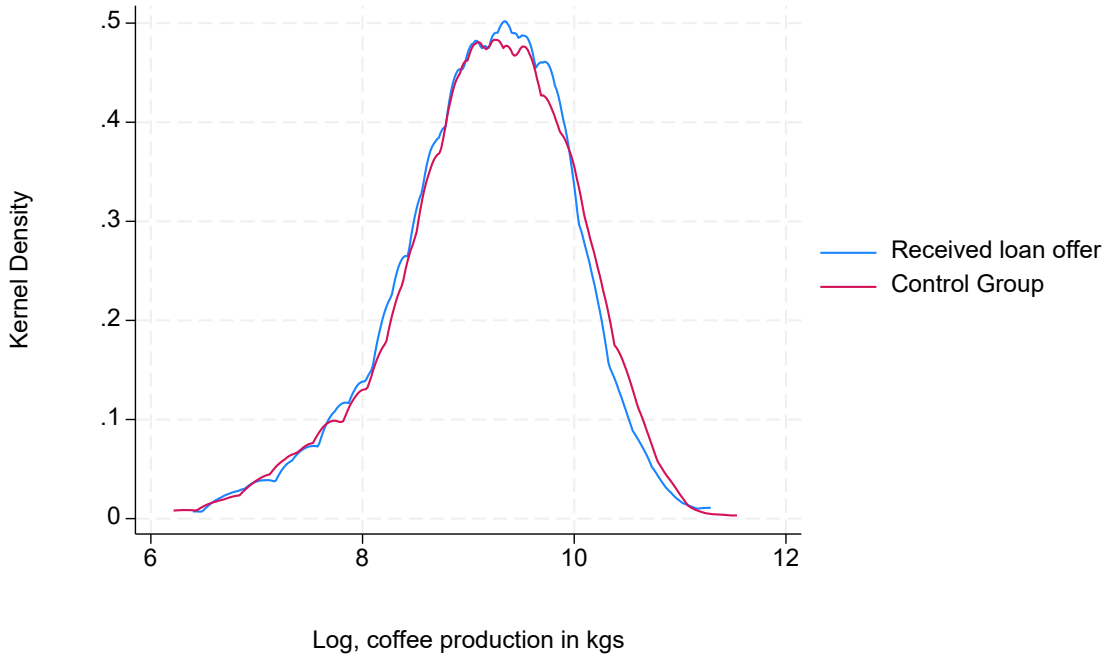


Figure 12. Coffee production, Son La, Vietnam, by Treatment Status

One of the requirements to sell to Phuc Sinh is that coffee farmers have the UTZ certification, and so the project helped all households that were uncertified prior to the project become certified. Prior to the project, about half of the sample farmers were already certified. Since certification should provide farmer value, we can explore whether the baseline data are consistent with the hypothesis that certification increases prices and farmer revenues at the very least.

While prices received by certified farmers appear higher, their revenue does not appear higher than revenue among non-certified farmers (Table 17). First, we take the data on coffee transactions reported by households and take the median price from those transactions.[26] The average median price reported by households with UTZ certification is about 2,400 Vietnamese dong higher per kilogram than the average median reported by uncertified farmers. However, due to lower production, the average estimated revenue is not statistically different between the two groups. Given we find that the paid costs are slightly higher among the certified farmers, at 45 million VND versus 40.3 million VND, we can already conclude that the certification may not have much value to farmers.

Table 17. Median Price Received and Estimated Revenue, Coffee Farmers, Son La, Vietnam, by UTZ Certification Status, 2022

	Certified Farmers	Uncertified Farmers
Median price (thousand VND/kg)	18.2	15.8
	(0.5)	(0.3)
Estimated revenue (million VND)	211.3	201.4
	(8.7)	(8.4)
Total costs (million VND)	45.0	40.3
	(1.9)	(1.5)

Notes: Standard errors in parentheses. Median price is average median price received by farmers among reported transactions. The estimated revenue is the median price multiplied by total reported production.

[26] *In pre-testing the baseline questionnaire, we learned that it was not easy to ask about coffee transactions. Because of the piecemeal nature of harvesting coffee, and the need to process it relatively quickly after harvest, households often sell coffee through the village agent on a daily basis. We therefore designed the survey form to ask about the total amount produced, which pre-testing suggested farmers would be able to estimate, and then about the three largest transactions in which they sold coffee.*

Before discussing the endline data collection and the qualitative work conducted at the end of the project, it is worth discussing the certification results above from one more perspective. The other two companies that process and sell coffee in Son La do not sell their coffee as certified. As a result, if on any given day they are offering higher prices than Phuc Sinh, they might be buying certified coffee even if they do not sell it as such. In other words, the coffee sold by other companies are a mix between certified and non-certified coffee. This might help explain the result; if the price premium were larger between certified and uncertified coffee then households might sell it more exclusively to Phuc Sinh, and that could help drive revenues up. But in the current market equilibrium, it is unlikely that certified coffee has a differential return.

Endline Data and Results

As discussed, the endline survey took place both as a quantitative and qualitative survey in May 2024. The quantitative survey took place as described in 75 households, between 26 May and 29 May. The qualitative work, which took place in the form of informational interviews and focus groups, occurred during the second half of May. Again, the goal of the quantitative work morphed into trying to find impacts only among those taking loans (rather than an intent-to-treat analysis), while the qualitative work will help describe reasons that the demand for project loans was low. Therefore, this section first describes quantitative results, and then moves to the qualitative findings before concluding.

Quantitative Endline Sample

As alluded to earlier in the report, after finding that few households took up loans, it did not make sense to conduct another full household survey, since the intent-to-treat effects would be impossible to find statistically. It seemed instead sensible to focus on average treatment effects on those who took up the treatment (the loans), relative to a similar control group. The challenge then was to find households in the control group that appeared similar to households that took up loans, since the control group should include households that both appear similar and those that do not.

To find households, we therefore applied the following procedure using the baseline survey. We first selected the 25 households with data that had obtained loans in the offers that took place in 2023 (not the earlier households). Second, we removed all communes with no loans, since they would not match location with those taking out loans, and third, we then estimated models using coarsened exact matching adding variables sequentially to ensure that some observable characteristics were the same between the 25 loan taking households for which we had complete data, and the control group households. We experimented with adding variables so long as a treatment household did not drop out; it made no sense to drop treatment households.

The final coarsened exact matching model included eight variables: the total number of coffee plots held by the household, whether a household owned a colour television or not, whether a household owned a flush toilet, whether a household owned a computer or not, whether a household owned a washing machine, whether a household had a red book for any of its plots, whether the household rented out any plots, and whether the household head was literate or not. This procedure left 122 potential control households; adding any further variables led to dropping loan households, which would mean they could not be matched.

We then took the 122 control households and randomly selected 50 households as targets for data collection, and 25 additional back-up households in case we could not reach the original 50. The idea here was to ensure that we could correct any estimates for observables at baseline through matching, and a larger number of matches would help with that procedure.

Endline Descriptive Results

To begin analysis of the endline quantitative data, we first examine average values for the primary study outcomes, by treatment and control group (Table 18). The average production is slightly lower among the treatment group than the control group; note that the production was substantially higher than that reported in the baseline survey, so it was a good year for

coffee bean production (despite a late start to harvest).[27] Since coffee areas are similar across the two groups, average yields are higher among the control group. We find that the average median price paid is a bit higher in the control group, but the average is affected by one outlier (without the outlier, the treatment price is a bit higher). As a result, the total value of production among the control group is higher, though the difference is not statistically significant. The labour use among both groups, and costs, are reasonably similar.

Table 18. Average Coffee production, prices, and input use, by Treatment Status, Son La, Vietnam, Endline, 2024

	Treatment Group	Control Group
Production (kg)	16488	17376
	(2083)	(1568)
Area (m^2)	3756	3719
	(172)	(168)
Yield (T/ha)	1.11	1.50
	(0.09)	(0.16)
Average median price (thousand VND/kg)	10.7	12.0
	(0.23)	(1.19)
Total Value, Production (million VND)	171.3	226.2
	(20.1)	(49.9)
Household Labour Days	309	352
	(34)	(28)
Hired Labour Days	108	130
	(22)	(21)
Total Costs (including inputs; million VND)	57.5	62.6
	(7.8)	(7.2)

Notes: Standard errors in parentheses. 75 total observations.

We next examine household income, breaking it into two main components. The first is coffee "profits", defined as the total value above less the reported costs. The second component is all other income, including income from renting out land or assets, animal sales, the sales of animal by-products, off-farm wages, non-agricultural self-employment, and remittances from urban areas. We omit the potential revenue from other crops, as households tended to only grow a small amount of rice if anything (not all households grew rice) and very few sold any rice.

We find that if anything the households that took loans have slightly lower incomes on average than the control group (Table 19). Consistent with Table 18, we find net coffee income is a bit lower in the treatment than the control group, but there is an outlier in the control group pushing up the average, so the difference is not statistically significant. If we consider the treatment group (without the outlier), all other income is about 22 percent of coffee income, so these households in general are quite dependent on coffee income. However, the results also suggest the loans did not affect either net coffee income or total household income.

[27] *Note that the sample was much larger at baseline (974 observations), which might lead to a concern that we are just observing quite productive households. In fact, average reported production was around 10-11 metric tons for the households in the endline sample at baseline, and their total estimated coffee value was lower than the sample average. Hence, it does not appear that the households chosen for the baseline were more productive; if anything, they were slightly less productive than average.*

Table 19. Average Income, by Coffee and Other Income and Treatment Status, Son La, Vietnam, Endline, 2024

	Treatment Group	Control Group
Net Coffee Income	113.7	163.6
	(14.5)	(46.7)
All other Income	33.6	38.6
	(9.8)	(11.1)
Total Income	147.4	202.2
	(20.6)	(47.9)

Note: All figures in million VND. Other income excludes crops other than coffee. Standard errors in parentheses. 75 total observations.

To check that income is not skewed for one group or the other by more than one outlier, we next graph the distribution of the logarithm of total income, by treatment status (Figure 13). We find there is clearly a low outlier among the group that took loans; otherwise, the distributions are primarily atop one another. The distribution of households in the loan group is somewhat less disperse than the control group. However, the distributions appear to reasonably overlap, so they do not suggest a clear advantage of one group over the other.

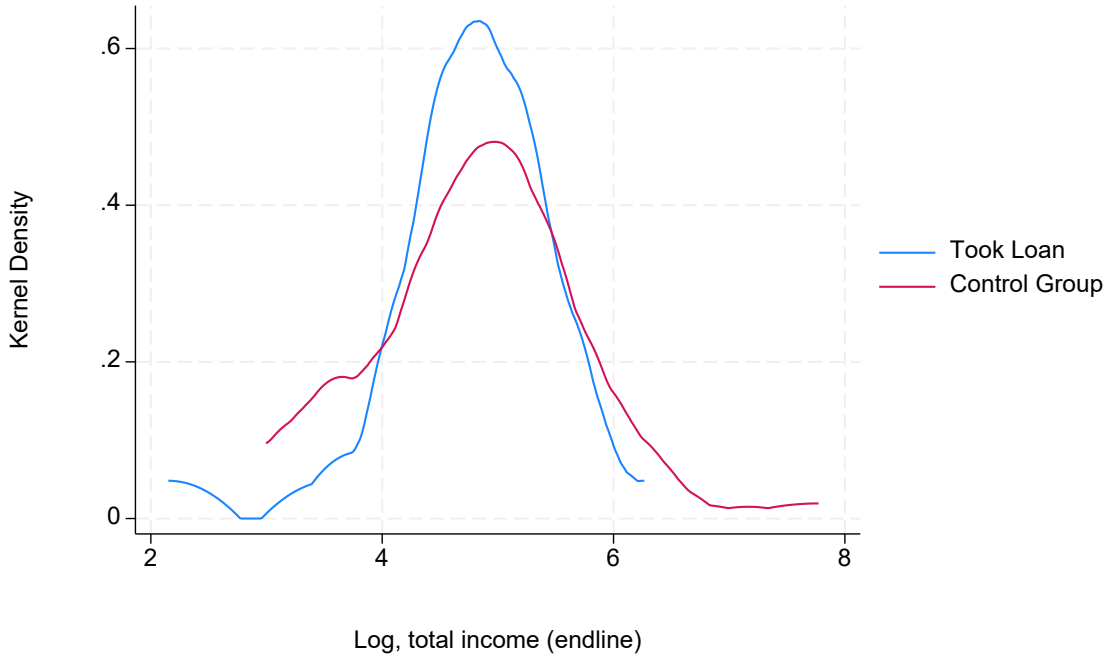


Figure 13. Logarithm of Total Income, by Treatment Status, Son La, Vietnam, 2024

Endline Regression Analysis

To attempt to confirm these results, we next run a simple analysis of covariance (ANCOVA) regression for almost all the outcomes, using the general specification:

$$Y_{i1} = \alpha + \beta T_i + \gamma Y_{i0} + \delta Z_{i0} + \epsilon_i \quad (1)$$

where *Y* represents the outcome, *T* treatment group status, and *Z* other control variables. The subscript *I* represents households, whereas the second subscript represents timing; if zero, it is measured at baseline, and one at endline. The error term is assumed to be mean zero. We estimate equation (1) in three ways. The first specification excludes the control variables, while the second one includes them.[28] We then note that the control households may not match the

[28] *We do not include the baseline outcome for the price received, since there is no reason they would be correlated given we are using a selection of sales; nor the total income.*

treatment households very well, so we first estimate propensity scores with the variables that were used in coarsened exact matching, and then use them as weights in a regression. In that regression, the control households are weighted as $\frac{\hat{p}}{1-\hat{p}}$, where $\hat{p}$ is the propensity score.

Results appear in Table 20. The coefficient estimates are all noisy and in no case can we reject the null hypothesis that the coefficient on the treatment indicator is zero. This finding is not surprising; it may suggest that the loans did not affect production or income relative to the control group, but underlying factors may have existed that made those households need these loans to be able to produce well in 2023. Further, because of the small sample size, we did not expect to observe statistically significant results here.

Table 20. Regressions Explaining Effects of Lien Viet Post Bank Loans on Outcomes of Interest, Son La, Vietnam, 2024

Outcome	(1)	(2)	(3)
Production (kg)	-213.7	-369.6	-683.1
	(2587)	(2488)	(2307)
Value, coffee (million VND)	8.39	6.89	2.70
	(23.8)	(23.73)	(22.1)
Hired Labour Days	9.83	6.92	6.23
	(24.1)	(23.49)	(21.21)
Total Input Costs (thousand VND)	4231	3926	1744
	(8216)	(8252)	(7683)
Average median price (thousand VND/kg)		-1.05	-0.88
		(1.77)	(1.03)
Total Income (million VND)		-56.4	-51.8
		(67.9)	(51.0)

Notes: Standard errors in parentheses. Each cell represents a separate regression and the coefficient on the treatment variable is reported. Column (1) includes the baseline outcome but excludes baseline control variables; column (2) includes them, and column (3) also weights control group observations using propensity scores generated from the variables used in coarsened exact matching. Price and income do not include the baseline outcomes, so coefficients do not appear in column (1).

Loan Behaviour

One concern related to the comparability of the treatment group in this context versus the control group is that the control group did not take out many loans for the prior growing season (Table 21). While 48 percent of the treatment group had another loan to grow coffee (beyond the Lien Viet Post Bank loans), only 18 percent of the control group had a loan during the previous growing season. Only a few of these loans came from banks; the majority came from informal sources. These loans were relatively small; they averaged 35 million dong among the treatment group and 44 million dong among the control group.

Table 21. Average Loan Size, Loans beyond Lien Viet Post Bank, Son La, Vietnam

Group	Coffee Loan beyond project?	Average loan size (thousand dong)
Treatment	48%	35166
		(31208)
Control	18%	44333
		(24934)

Notes: For average loan size, standard error in parentheses. Average loan size is conditional on taking a loan.

Endline Qualitative Data Collection

Qualitative data collection took place in the form of focus groups and key informant interviews (KIIs) during the second half of May 2024. Eight focus groups took place in total. Seven of the focus groups across five communes in which at least one farmer took a loan; these focus groups included between six and eleven participants, and a balanced gender representation was sought. In these focus groups, participants were briefed on the project's objectives and the purpose of the endline survey, and provided verbal informed consent before the discussions began. The final focus group took place with Phuc Sinh company staff, to delve

deeper into production levels, to understand the role of the Rainforest Alliance certification system, and to understand their purchasing mechanism.

KIIs were run to develop a deeper understanding about why the loans were not widely taken up and informants perceived prospects for agricultural finance in the near future. Eight KIIs were conducted with individuals representing various stakeholders including village leaders, leaders of agricultural lending groups, leaders from Vietnam Social Policy Bank lending groups, leaders of the M7 micro credit lending scheme, private money lenders, and traders from Phuc Sinh.

Endline Qualitative Results

The village level focus groups all confirmed that a switch to *arabica* coffee production from maize production around the turn of the century substantially improved living standards. The key challenges to maintaining production include an aging tree stock, the changing climate, and price variability. Nonetheless, the proliferation of coffee companies and cooperatives has facilitated competitive pricing, providing farmers with better income opportunities. New appropriate hybrid varieties have been developed through a recent project (Koutouleas et al., 2022), but they are not yet widely planted. Longer term finance would be required to replace the current aging tree stock.

For several reasons, the project borrowers would seem to have used the Lien Viet Post Bank loans because they had limited choices for other loans. Most households did not require loans as they had adequate savings from previous seasons. And other sources of capital, as we describe below, may have appeared more flexible and/or had lower direct interest costs associated with them. These qualitative findings are consistent with the loan data above, suggesting that control group households had very few coffee loans.

There are typically three formal sources of loans available in the studied communes, and two informal sources:

1. The Agricultural Bank of Vietnam has a branch that covers Mai Son district, and has begun to offer flexible loans that are tailored to agricultural needs. These loans can either be for coffee production or infrastructure, such as drying ovens and improved processing equipment. They charge what were described as competitive interest rates. However, they require both insurance and collateral in the form of land use rights (red book).
2. The Vietnam Social Policy Bank (VSPB) offers loans specifically targeted at improving living standards and agricultural productivity. Loans can be for community development or agricultural inputs. They offer quite low interest rates and extended repayment periods, with no collateral requirement. However, larger loans are only available to households that are deemed near-poor or poor, and require regular interest payments.
3. The microfinance institution M7 offers loans facilitated by the Women's Union, targeting women. These loans are small, rapidly disbursed, and do not require collateral. However, they immediately accrue interest and are limited to specific uses.
4. Households can borrow from private traders or through pre-sale of their coffee. These loans are quick to obtain and are often used for urgent needs. They either require high interest rates or the commitment to sell coffee exclusively through one trader, either of which can have drawbacks.
5. Households can borrow through family or friends, which can lead to strained relationships if not paid back.

Two first issues with the Lien Viet Post Bank loans are as follows. First, many farmers have access to sufficient savings. Second, the project loans offered by Lien Viet Post Bank were competing with the Agricultural Bank, for some farmers with the VSPB, and then loans offered by private traders. The timing was poor to offer a market interest rate, as when the loans were

offered the market rate was higher (1.3% per month) than the perceived rate offered by the Agricultural Bank (0.8-1% per month). Structurally, then, the decision to offer loans at the market interest rate was a key challenge. Moreover, for eligible farmers the VSPB offers the types of small loans offered by the project (50-100 million VND) at even lower interest rates (0.45-0.75% per month).

Several other reasons came up, which can be categorized as either structural issues, or issues related to trust and risk aversion. We describe these below.

Structural Issues

1. *Deduction of Principal and Interest from Coffee Sales*: Farmers dislike Phuc Sinh's practice of deducting loan principal and interest directly from coffee sales proceeds. This limits farmers' control over cash flow needed for essential expenses like hiring labour or investing in farm inputs until the coffee is sold.
2. *Debt Repayment Concerns*: Farmers are reluctant to commit to a short-term repayment schedule for both principal and interest, fearing they might not be able to gather sufficient funds as per the contract terms.
3. *Repayment Difficulties*: Similarly, some farmers who took loans ended up with insufficient coffee sales to Phuc Sinh result in inadequate funds in their bank accounts, requiring labourious cash deposits at Lien Viet Post Bank.
4. *Absence of Local Bank Officers:* The absence of Lien Viet Post Bank officers in the commune makes it inconvenient for farmers to inquire about loans. They prefer face-to-face interactions to build trust. The multiple trainings held, it seems, were inadequate.
5. *Perceived Optimal Practices*: Farmers are confident that their current methods for fertilization and coffee care are already effective. They believe additional investment would not significantly improve productivity. Phuc Sinh, through the Rainforest Alliance certification, requires farmers to adhere to company-specific techniques, such as restrictions on herbicide use.
6. *Technological Barriers*: Many farmers are not familiar with internet banking and prefer cash transactions.
7. Flexible lending option from Agricultural Bank: The Agricultural Bank of Vietnam has been offering lending packages which are flexible in repayment policy, which makes the Lien Viet Post Bank structure seem too rigid.

Trust Issues and Risk Aversion

1. *Logistical Challenges*: Farmers expressed a concern that the collective coffee quantity from borrowers might not be enough for Phuc Sinh to send a truck to their village, forcing them to incur high transportation costs.
2. *Dependence on Agricultural Bank of Vietnam*: Respondents expressed a widespread belief that the Agricultural Bank will not issue new loans or renew existing ones for those who borrow from Lien Viet Post Bank. This creates a fear of losing access to crucial funding from the Agricultural Bank.
3. *Risk Aversion*: Farmers often have access to extensive land, but limited manpower. Families with 2-3 hectares struggle to manage effectively without additional help, as their children often work elsewhere, leading to neglect of agricultural practices. For instance, while potential earnings from a plot may reach 100 million, investing in better production techniques will cost them 10 million VND, with the potential to increase their profits to 120 million. However, the uncertainty of achieving these earnings, coupled with the upfront capital investment, often deters farmers from taking such risks. As a result, they prioritize basic living expenses and durable necessities over further farm investments.
4. *Lack of Direct Sales to Phuc Sinh*: Finally, Phuc Sinh uses purchasing agents in villages, and farmers do not sell coffee directly to Phuc Sinh, making them distrust the whole structure of the loan. For example, they described a concern that Phuc Sinh might manipulate coffee prices when farmers sell to them to reduce debt.

Gender, Financial Decision Making, and Control over Financial Resources

We took the opportunity of the qualitative data collection to understand how men and women perceive decision making about finances, and control over financial resources within the household. The focus groups suggested that men and women both suggest that on a day-to-day basis, men and women are equal in decision making. However, for either strategic purposes (investments) or major financial decisions, men play a larger role. Therefore, women play a less important role in loan procurement; in other words, if loans were only offered to women (e.g. through the Women's Union), men are likely helping make the decision about whether to take a loan or not.

In terms of control over resources, women clearly have less control within households. Men tend to control savings, bank accounts, loans, and transfers into the household. This control relates to patriarchal norms, but these norms can also manifest themselves in other ways, helping to solidify those norms. For example, women face administrative hurdles in accessing finance, and often have limited technological proficiency, further limiting their access to internet banking or other digital financial products. And the limits on access to digital financial products further limits their control over household resources.

Summary: Endline Analysis

We do not find evidence that households taking project loans did better than a subset of the baseline control group that had similar observable characteristics. However, the "treatment" households were clearly in need of loans, given that the control group did not have many loans at all. The qualitative work suggests the loan products were not as flexible as loans available from the Agricultural Bank of Vietnam, and carried a higher interest rate. The interest rate issue was unfortunate, as the project loans were offered at a particularly bad time in terms of market interest rates. However, better loan design would have likely improved demand somewhat. However, other factors, such as concerns about future financial access and risk aversion, also led to lower loan demand.

There are important lessons for AVCF in Vietnam. The lack of a true apex buyer in this context was a clear issue; while Phuc Sinh buys a substantial share of coffee in the area, the presence of other buyers limits their bargaining power and hindered the AVCF model. Second, it would seem important to workshop the products more extensively with the lending market; while the products were tailored to coffee production, they lacked some of the repayment flexibility offered by other lenders that is valued by borrowers. Third, a much clearer use case for AVCF is in helping the transition between old and new tree stock for crops such as coffee (e.g. Bronkhorst et al., 2017). Unfortunately, in this specific case though better breeds of *arabica* are available for Son La, in neither our focus groups nor the KIIs did respondents consider the need for financing a transition from old to new tree stock. Moreover, respondents in both focus groups and KIIs brought up a desire for local bank service points, which leads to much higher transaction costs than newer mobile banking products which could help facilitate less expensive loan products.

8 Impacts

8.1 Scientific impacts – now and in 5 years

We consider the scientific impacts of the project to be contributions to bodies of knowledge that will help future studies of agricultural finance broadly speaking, or will help play a role as a backbone for future studies. There are two primary project findings that we want to highlight as having scientific impacts.

First, the research in Myanmar provides a question, rather than an answer. We examine whether a proprietary credit scoring method improves prediction of default among a sample of borrowers, and find no evidence that it improves prediction. Unfortunately, because the method is proprietary, we do not know what was in the model, but it likely does not help lenders assess who among borrowers is more likely to default, suggesting that it is not a cost-effective method for agricultural lending. This finding contributes caution to a small literature that promotes the use of technology in developing better credit scoring models.

Second, our research in Indonesia on women's decision making related to agricultural and financial decisions advances knowledge on the participation of women in decision making, in several different ways, in Indonesia. One of the key findings is that there is substantial heterogeneity in who makes decisions within households in Indonesia, both related to agriculture and related to finance. Although we did not use the Women's Empowerment in Agriculture Index (WEAI) resources that now include modules on market inclusion (Malapit et al., 2023), nonetheless the paper will contribute to a growing literature on women's empowerment in agriculture beyond the farmgate.[29]

Third, the research project in Vietnam should have two impacts within the next five years, although the impact is limited now. The qualitative component, when used with statistics, will lead to a research paper that sheds a great deal of light on minority communities now largely specialized in growing coffee. Were those households continuing to grow maize, as they had 25 years ago, their situations would be quite different; most likely, there would be migration pressure given the large returns to labour relative to maize cultivation at prevailing yields. The same work will provide second lessons for designing future projects that are trying to increase access to finance. Flexibility of repayment would seem a key issue, but also better understanding what the demand for credit is within a set of communities, before designing randomized trials centred around credit offers.

8.2 Capacity impacts – now and in 5 years

During the project, we conducted several different capacity building activities. Here we highlight three specific capacity building efforts that we think will be helpful to the target countries.

1. In all three countries, we conducted training on randomized control trials, as we had planned randomized control trials to be a main focus of the research in all three countries. The training was most extensive in Myanmar, and among members of the Myanmar Economics Association. Though research projects with interventions are not possible in Myanmar at present, that capacity could be used in future projects if conditions improve. In Vietnam, the trainings have made IPSARD a more informed consumer of research conducted with randomized control trials.

[29] *The market inclusion modules for the WEAI were not yet available when the work was planned, and our goal was to go farther into financial decision making anyway. The survey modules used, therefore, more closely follow those used in Bangladesh by de Brauw, Kramer, and Murphy (2021).*

2. In Indonesia, the main impact will hopefully be on the consideration of ethics review in conducting fieldwork in the future. We trained researchers on the role of informed consent in conducting surveys with human subjects, and the importance of an external review. It had not been common practice among our collaborators to describe the research purpose to subjects in a systematic way, to acknowledge that participation was a choice, and an external ethics review can help ensure that any potential harm is minimized throughout the research process.
3. The long relationships required for this project—in part due to COVID—in both Indonesia and Vietnam have brought along better information sharing in both directions, increasing the capacity of IFPRI and host country researchers. From the IFPRI perspective, the long relationships have engendered a better understanding of the agricultural policy processes in both countries, facilitating more timely advice when required. From the perspective of IPSARD and BRIN/ICASEPS, we have provided advice about the forefront of the global agricultural economics literature in developing countries, often directly sharing articles or synopses of articles.

8.3 Community impacts – now and in 5 years

This sub-section is focused on Indonesia and Vietnam.

8.3.1 Economic impacts

The economic impacts of the project are minimal at present. In Indonesia, there were some short-term benefits to small numbers of producers who took loans from PT MAL, particularly in rice, but then those producers were relatively challenged in paying back loans. While the short-term benefits might have been there, they were small, and we did not attempt to trace post-trial benefits. In Vietnam, the number of loans that were made was relatively small, and we could not measure differences in income, so although the loan takers were in need of liquidity, it is not clear from the data that the impacts were more than minimal.

That said, in both Indonesia and Vietnam, there is clear potential for impacts on policy moving forward, which could lead to economic impacts within the next five years, depending upon the speed of policy processes. In both countries, the work conducted through government research bodies (ICASEPS and IPSARD, respectively) helps ensure the project messages around the importance of agricultural finance generally and the potential for AVCF where appropriate, more specifically. In Indonesia, the clear goal would be to offer a specific alternative KUR loan, dedicated to agricultural lending. At present, some specific KUR loan types exist, but not for agriculture, and most KUR loans are used for purposes other than agriculture. In Vietnam, there was a major shift in agricultural policy in October 2021, towards green growth (Decision 1658/QD-Ttg, 2021). To reduce greenhouse gas emissions in agriculture, investments are required, and AVCF is seen by IPSARD as a way to potentially ensure those investments occur.

8.3.2 Social impacts

In our proposal, we noted that there can be both positive and negative impacts to expanded formal credit access. Positive impacts include the ability to borrow to increase income; the pilots in this project do not appear to have led to higher incomes in general among loan recipients relative to those who did not; as the Lien Viet Post Bank, in particular, did not have interest in continuing to offer the loans designed for this project to coffee farmers, this impact did not come to pass now. Nor did negative impacts; a concern with offering credit is that disadvantaged groups might have a hard time paying back loans, putting them farther into debt; further, as we attempted to take care about in the loan design in Vietnam, successful loan offers that only go to men within households could negatively affect intrahousehold bargaining power among women.

However, social impacts could be quite positive in years to come, particularly considering some of the indirect impacts of the project, particularly in Vietnam. Our partners in implementing the project in Vietnam (VietED) continue to work with Lien Viet Post Bank, and they have taken learnings from this project to the bamboo shoot value chain in Son La as a result. More farmers applied for loans through that project, suggesting that the lessons have been used and can have social impacts beyond farmers in the coffee value chain. Moreover, as part of a DFAT funded project (GREAT II), they have involved financial institutions in designing products for value chains in the Hue area, to help better design the financial products from that perspective. Hence, assuming these lessons continue to spread, there are potentially quite positive social impacts.

8.3.3 Environmental impacts

The project aim was not to have deleterious environmental impacts. Given that pilots conducted in both Indonesia and Vietnam were small, the project did not have environmental impacts at all, and it should not be expected to have any environmental impacts in the future.

In Vietnam, if lessons of the project can be incorporated into current “green growth” policy goals, including helping assist farmers in shifting from more to less environmentally intensive production techniques, then there is potential for project lessons to contribute to positive environmental outcomes. Environmental impacts are unlikely in the other two project countries.

8.4 Communication and dissemination activities

We conducted a large number of communication activities during the course of the project. We also initially developed a project Facebook page; a policy changed at IFPRI allowing us to put a project page on the IFPRI website; that page will remain and links to all publicly available project outputs.

The project dissemination activities included:

1. At the onset of the project in September 2018, we held an inception meeting in Hanoi, in which we invited participants from our partners in Myanmar;
2. We held a second workshop in Myanmar in February 2019, to introduce the project to interested stakeholders there;
3. We held an inception workshop in Bogor, Indonesia in April 2019, again including interested stakeholders in Indonesia;
4. We held country report workshops in each country in 2019. We conduced the workshop in Myanmar, in Yangon, in November 2019;
5. We then held a second workshop in Jakarta, Indonesia in November 2019, detailing the findings from the first phase country report;
6. We held a workshop in Vietnam in December 2019, which also covered the first phase country report.
7. An online Mid-Term review took place in February of 2023, including participants from Indonesia, Vietnam, and Myanmar, and afterwards adjustments to project plans to finish the project were made and upheld.
8. The Minister of Agriculture and Rural Development of Vietnam, Le Minh Hoan, visited IFPRI in Washington, DC in May 2022; the AVCF project in Vietnam played a major role in the discussion.
9. Following the removal of travel restrictions, in Indonesia we held another short workshop in July 2022 to keep momentum from the first pilot project, which had been conducted in the first half of 2022.

10. A final workshop for the Indonesia component was conducted in Bogor, Indonesia, in August 2023. The workshop described preliminary results from all of the trials and began to develop policy messages.
11. A final workshop for the whole project was held in Hanoi, Vietnam, in May 2024. The workshop included presentations of research from all three countries, and discussed policy implications particularly for Vietnam.

To note, no further activities occurred in Myanmar following the coup in early 2021.

9 Conclusions and recommendations

9.1 Conclusions

This project has provided several lessons about attempting to increase access to finance among smallholders and other marginalized value chain actors in Southeast Asia. While the pilots conducted by the project had varying success, they all provide lessons about designing better AVCF products in the future, which could be important for meeting policy goals. Some of the most important lessons include:

1. Technology may be useful in reducing transaction costs, but it is important to understand its limitations. In Myanmar, for instance, the automated credit scoring method did not appear to predict default at all. In Vietnam, farmers suggested face-to-face interactions were preferable for marketing loan products.
2. While farmers may seem to be missing opportunities for investments from a macroeconomic perspective, it does not automatically mean that farmers or other value chain actors will automatically demand finance. Financial products must be attractive on a number of dimensions, including interest rates, payment terms, and familiarity with those offering them, to ensure that demand follows. This point fits both Indonesia and Vietnam.
3. Links between financial institutions and off-takers need to be strong to make AVCF work, and off-takers need to be dominant buyers in the area. The business position of the off-taker must also be strong, as the PT MDP example shows.
4. Agricultural and finance policy are both important in shaping the opportunities for AVCF, but engaging with agri-food companies to understand their needs can help find opportunities for AVCF in the future. These companies could come either on the input side, if specific inputs could boost productivity, or the collecting and processing side, where more quality product can allow such companies to use their capital more efficiently.

9.2 Recommendations

Two main recommendations derive from the research described above. First, a necessary condition for AVCF to be successful is to understand “consumer” demand, whether the consumer in this case is the farmer, a collective, or a cooperative. Second, the offtaker characteristics are particularly important along three dimensions. We describe both in more detail below, before adding a final note on policy.

Many policy documents lament “missing investments” in the agricultural sector in Southeast Asia and other Low- and Middle-Income Countries. However, we found demand for loans was far from automatic among farmers. For example, the loan product tailored to coffee value chains in Vietnam was not sufficient to induce much loan demand. Factors in loan design that would seem important in future projects are to understand the relationship between farmers and current financial institutions, and to consider flexibility in payment structures. Investing up front in quite clearly understanding the relationship between targets for increased access to finance (farmers or other value chain actors) and formal financial institutions would help ensure higher take-up. These points are even more important if investments are required to meet future policy goals, as with green growth targets in Vietnam.

It is worth considering offtaker characteristics from three perspectives. First, offtakers should be able to demonstrate ample assets to at least partially guarantee the loans taken by their clients. In Indonesia, for example, it is clear in retrospect that the Harapan VIII group did not have enough assets for that guarantee, and so the non-performing loan rate was quite high.

For the bank, due diligence practices are important for the offtaker, to improve the probability of AVCF success.

Second, the presence of an “apex buyer” in the market—or market power—is quite important. The buyer need not buy everything, but just having a relationship with farmers is not enough, as farmers are rational and will seek a higher price for their products if it is available. The example in Vietnam provides a good case study here—the repayment scheme had to be complex, because it was not a guarantee that the farmers would sell to the coffee company, and as a result the bank stated they were not happy with the relationship with the offtaker. Had the offtaker been able to buy more of the coffee, this challenge would not have occurred.

Third, offtakers should have long standing, positive relationships with the farmers or collectives with whom they work. AVCF is probably, therefore, not appropriate for a “new” value chain—for example, one that attempts to develop a new type of agricultural product; from a policy perspective, the One Commune, One Product campaign in Vietnam that worked with communes to create differentiated agricultural products was not appropriate for AVCF. Within this project, offtakers and farmers all had relationships, but we highlight this point here, so it is not forgotten in future projects.

In Indonesia and Vietnam, policy changes could certainly help make AVCF more viable and attractive to banks. In Indonesia, a more agriculturally oriented KUR program could market to banks that it is possible to make blocks of KUR loans to farmers sponsored by off-takers; banks could be encouraged to do due diligence in understanding the liquid assets of the off-takers before beginning to issue the blocks of loans. In Vietnam, collateral requirements remain an important issue, particularly in the absence of much of a microfinance sector. Clarifying the use of alternative collateral (such as relationships with off-takers) in bank loans would help banks see the value in AVCF. Moreover, building a legal structure amenable to a warehouse receipts system would be helpful for crops covered, as crops can become collateral against loans.

9.2.1 Suggested Future Research

Though this project found AVCF challenging to implement and evaluate, we believe the learning from this project can be used effectively to design future research around AVCF in Indonesia or Vietnam, or other countries with similar development levels. To first consider the two countries covered by this report, there are some clear possible directions for future, policy relevant research. First, in Vietnam, there are potential uses related to planned investments in low carbon rice. The government is planning a large expansion of the Vietnam Sustainable Agriculture Transformation Project, which helped reduce emissions from rice production among participating areas. An AVCF scheme could help either collectives or farmers make required investments to reduce water use, and eligibility for carbon credits could be used as an incentive to induce additional demand. The research team collectively believes research in developing such financial products could play a role in increasing demand among farmers for low carbon rice technologies and could help Vietnam attain its greenhouse gas emission reduction targets by 2030.

In Indonesia, it could be possible to adjust the type of KUR loans available to help make them more amenable to increasing agricultural production (e.g. Gunawan et al., 2021). The size of agricultural KUR loans, for example, could be increased if farmers have records of existing relationships with off-takers. Off-takers could potentially be engaged to assist with blocks of KUR loans. Future projects could help develop criteria that banks could use to find quality off-takers, using the learning from this project. A proposed path to do so would be to 1) Work with the *Otoritas Jasa Keuangan* (OJK), or Financial Services Authority, to build the case that agriculture is not well-enough served by current KUR loans; 2) To build up criteria for the off-taker characteristics required for this type of project; and 3) To pilot test a scheme, clearly motivated by AVCF, that fits this description, with a large enough pilot to inform further decisions by the OJK. The use of digital credit scoring, which is being piloted in Indonesia in the next couple of years, could also play a role in determining credit worthiness, but as out Myanmar results show it will have to first be tested for effectiveness in predicting defaults.

The lessons from this project need not be limited to Vietnam and Indonesia. However, the project results make it clear that knowledge of financial regulations as they pertain to agriculture are particularly important to begin designing AVCF schemes. The policy reports completed in the first phase of this project were important to building that understanding among the project team. With that knowledge, it is then possible to shape credit products that fit within regulations and address needs of farmers or other agri-food value chain actors. Without much banking sector development, it could be quite difficult to make such programs effective; as a result, they are more likely to succeed in low-middle income countries than low-income countries, where banks are more constrained. An exception could be low-income countries with a robust microfinance sector, as microfinance operators are typically more flexible than formal banks.

10 References

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https://www.youtube.com/watch?v=l7N2bxFgM88

11 Appendixes

11.1 Appendix A: Additional Tables

Appendix Table A.1. Meetings Conducted by Van on behalf of IFS4Ag Project, Vietnam, 2020 and 2021

Meeting with:	Value Chain role	Comment
Inaugural meeting, ACIAR Agribusiness Resource Group	Coordinate potential ACIAR partners	Got ideas about potential lenders from meeting in particular
IT start up (no name)	Fintech	Potential partner wanted more information to generate a credit scoring model using machine learning
F88	Finance company	Mostly giving personal asset loans (with high interest rates)
Happy money lending service	Finance company	Only based in Hanoi, mainly mortgages, inflexible
G-group	Finance company	Mainly lending for consumer goods (motorbikes, laptops) in urban areas, not too flexible; peer-to-peer platforms
IPSARD	Partner	Get additional ideas about potential partners
BIDV	Major bank	Has a trust fund; wanted to check whether they could offer AVCF type loans
Icheck.com.vn	Logistics	Working on organic traceability; knew of some local cooperatives providing loan guarantees (Dong Anh district) through Lien Viet Post Bank
Lien Viet Post Bank	Finance	Went to Dong Anh branch for meeting; presentation (provided by researchers) needed more specificity
SMEDF workshop	SME focused workshop	Attended to see if any are focused on ag value chains
Tan Dan organic cooperative	Producers	Near Hanoi; cooperative rents land and farmers are either tenants growing vegetables or are paid labourers for remaining land. Unclear partnership.
SMEDF direct meeting	Capital Fund	SMEDF actually runs a big revolving fund; but very slow disbursement even if they were quite interested
VietED	Consulting Firm	Was at the time implementing the finance program for the GREAT project (DFAT

	funded); potential linkages with microfinance company

Appendix Table A.2. Farm and non-Farm Subsidiaries of PT Mitra Bumdes Nusantara

Subsidiary Company	Province	Regency
PT Mitra Desa Kawasan Transmigrasi Rawapitu	Lampung	Tulung Bawang
PT Mitra Desa Kawasan Transmigrasi Mesuji	Lampung	Mesuji
PT Mitra Desa Pamarican	West Java	Ciamis
PT Mitra Desa Cisuka	West Java	Tasikmalaya
PT Mitra Bumdes Bersama Sliyeg	West Java	Indramayu
PT Mitra Desa Tempuran	West Java	Karawang
PT Mitra Bumdes Buahdua	West Java	Sumedang
PT Mitra Desa Intan Garut	West Java	Garut
PT Mitra Bumdes Conggeang	West Java	Sumedang
PT Mitra Bumdes Warungkondang	West Java	Cianjur
PT Mitra Desa Bersama Ligung	West Java	Majalengka
PT Mitra Desa Sleman Sembada	Yogyakarta	Sleman
PT Mitra Bumdesa Karanganyar	Central Java	Karanganyar
PT Mitra Desa Grobogan Sembada	Central Java	Grobogan
PT Mitra Desa Kebumen	Central Java	Kebumen
PT Mitra Desa Ponorogo	East Java	Ponorogo

Note: Most non-farm subsidiaries reported selling rice.

Appendix Table A.3 In-kind Form of KUR Loan for Rice Farmers, Ciamis, Indonesia

No.	Item	Volume	Unit	Price per unit (Rp/unit)	Value (Rp)
1	Cost of land	10,000	m2	131.4	1,314,000
2	Input costs				
	a. Rice seed	25.0	kg	10,000	250,000
	b. Fertilizers				
	- NPK 30-	400	kg	8,000	3,200,000
	- Nitrea	50	kg	8,000	400,000
	- KCl	100	kg	8,000	800,000
3	Insurance			36,000	36,000
	TOTAL COST				6,000,000

Note: If a farmer had 1 hectare (no farmer has that much land), the total loan amount would be Rp 6 million or about US$451. As the average rice yield in Indonesia is about 5.2 t/ha, and the BULOG farmgate price in 2021 was around 6000 Rp/kg, revenues would be about Rp31,200,000/ha, meaning that returns to land and labour (and profit) would be around Rp25,200,000/ha (or around US$1894/ha at prevailing exchange rates at the time) under these basic assumptions.

Appendix Table A.4. Short term Loan Product offered by Lien Viet Post Bank in Vietnam

Loan attributes	Loan characteristics
1. Target customer/Borrowers	• Households are producing Coffee in the operation area of LPB Son La Branch • Households are part of Phuc Sinh Company VLC • Households need seasonal loans for Coffee production;
2. Loan purpose	Loan is intended for investment in coffee production activities: • Production inputs: Fertilizers, pesticides, and equipment to support coffee production • Labour: Caring, harvesting
3. Loan ceiling	Maximum is 50 million VNĐ/households
4. Loan period	• 3- 6 months (max)/Loan period • Timing of loan disbursement: From July to Sept in 2022 (first period); occurring in February 2023 with marketing prior to Tet (second period)
5. Principal payment, interest payment	* The suitable time for coffee care (From March to August); for coffee harvest (From September to December). Refer to CFM • Interest paid monthly • Principal at the end of the period (when selling coffee to Phuc Sinh), according to the coffee production cycle. • Payment is made by Phuc Sinh to LVPB to satisfy the debt, farmer will receive the balance from Phuc Sinh.
6. Collateral/Mortgage	Collateral not required
7. Loan disbursement	By bank's regulation
8. Interest rate	• 11-12%/year • Loan insurance fee from 150,000 - 200,000 VND/loan

Appendix Table A.5. Short term Loan Product offered by Lien Viet Post Bank in Vietnam

Loan attributes	Loan characteristics

1. Target customer/Borrowers	• Households are producing Coffee in the operation area of LPB Son La Branch
	• Coffee production is on land owned, not rented
	• Households are part of Phuc Sinh Company VLC
	• Households need loans for investment in the following areas:
	  o Improve standard coffee production process
	  o New planting

2. Loan purpose	Loan is intended for investment in coffee production activities: • Apply Standard Procedures required by Phuc Sinh • Applying technology to the coffee production process • Planting new coffee and applying Phuc Sinh's model
3. Loan ceiling	50 < X <= 100 million VNĐ/household
4. Loan period	• 9 months + 1 backup month loan period • Timing of initial loan disbursement: Between July-Sept, 2022 in initial case

5. Principal payment, interest payment	• Interest paid three times (every three months)
	• Principal paid either:
	  o Option 1: At end of loan period
	  o Option 2: Every three months (with interest)
	• Payments are made by Phuc Sinh to the bank. They are deducted from the farmer's revenue if payment is made at time of coffee sale, otherwise the farmer pays LVPB directly in cash or deposit money into the bank saving account.

6. Collateral/Mortgage	Collateral not required
7. Loan disbursement	By bank's regulation
8. Interest rate	• 13-14%/year • Loan insurance fee from 150,000 - 200,000 VND/loan

Appendix Table A.6. Approximate Costs of Growing One Hectare of Shallots, UDOP Trial, Nganjuk Regency, Indonesia

No	Description	Volume	Unit	Unit Price (IDR)	Value (IDR)
1	**Land Rent**				**23,000,000**
2	**Production Requirements**				
a	Seeds	1200	kg	55,000	66,000,000
b	Herbicide	6	liter	125,000	750,000
c	Fertilizer				
	Saprodap	10	Sack	320,000	3,200,000
	NPK	400	kg	18,000	7,200,000
	KCl	200	Kg	17,000	3,400,000
	ZA	100	Kg	6,800	680,000
	Compost	40	Sack	40,000	1,600,000
d	Pesticide				13,000,000
	Total, Production Costs				**95,830,000**
3	**Labour Requirements**		**manday**	**100,000**	
	Tillage			11,800,000	
	Planting			3,600,000	
	Seedling cutting			1,500,000	
	Plant Husbandry			19,500,000	
	Hedging			3,500,000	
	Other costs			10,000,000	
	Harvesting			12,000,000	
	Total Labour Cost				**61,900,000**
4	**Water cost**				**2,500,000**
	TOTAL				**183,230,000**

Appendix Table A.7. Analysis of Total Covered Production Costs for Partial Loans, Vegetable Producers, Pujon Subdistrict, Indonesia (4 hectares), 2022/2023

No.	Input	Volume	Units	Value (Rp)
1	Seeds			12,291.333
2	Fertilizers			
	NPK 16-16-16	1100	Kg	19,360,000
	NPK 15-6-21	300	Kg	5,520,000
	Nitrogen	450	kg	8,280,000
3	Soil Conditioner	26	Liters	1,430,000
	TOTAL (for Credit)			46,881,333

Appendix Table A.6. Potential Partners Approached after Pilot with PT Mitra Desa Pamarican, Indonesia

Potential Partner	Product	Location	Reason not Selected
Rice Mill	Rice	Sragen Regency, Central Java	Not interested
Corn Group	Corn	Sragen Regency, Central Java	Deemed risky due to pests
Boyolali	Rice Seed	Sragen Regency, Central Java	Already finance seed growers
KSP Mentari Dana Mandiri	Not recorded	Magelang, Central Java	Demand for credit too large per farmer
Rice group	Rice	Kulon Progo Regency, Yogyakarta Province	MoA deems their average yield too low
Seed producers	Rice seed	Bantul Regency, Yogyakarta Province	No single off-taker
Rice seed producers	Rice seed	Sieman Regency, Yogyakarta Province	Producers prefer subsidized fertilizer to commercial fertilizer
Sumber Makmur Saving-Credit Cooperative	Rice seed	Bantul Regency, Yogyakarta Province	Producers prefer subsidized fertilizer to commercial fertilizer
PT Benih Citra Asia	seed	Jember Regency, East Java Province	Seed producer facilitates KUR for farmers
CV Adi Jaya	seed	Nganjuk Regency, East Java Province	Considered participation
CV TWINN	Rice and corn seed	Nganjuk Regency, East Java Province	Did not want in-kind credit
CV Megatani Mandiri	Rice seed	Nganjuk Regency, East Java Province	Management, seed growers decided against
UD Parahyangan Timur Seed Community	Rice Seed	West Java Province	Did not want in-kind credit
PT Fiona	Rice Seed	Subang Regency, West Java Province	Cooperative provides farmer credit
PMK BOS	Vegetables	Buleleng Regency, Bali Province	Considered and tried to come up with Letter of Agreement between farmers and management
SUBAK	Rice	Karangasem Regency, Bali Province	Management, growers to take decision
PMK Baja Tani	Rice, Corn	Bali Province	Inconclusive discussions
ID Food	Sugarcane	Subang Regency, West Java Province	Provide in-kind credit already
ID Food	Corn, Rice	Gianbar and Tabanan regencies, Bali Province	Provide in-kind credit but poorly adopted

Appendix Table A.6 continued

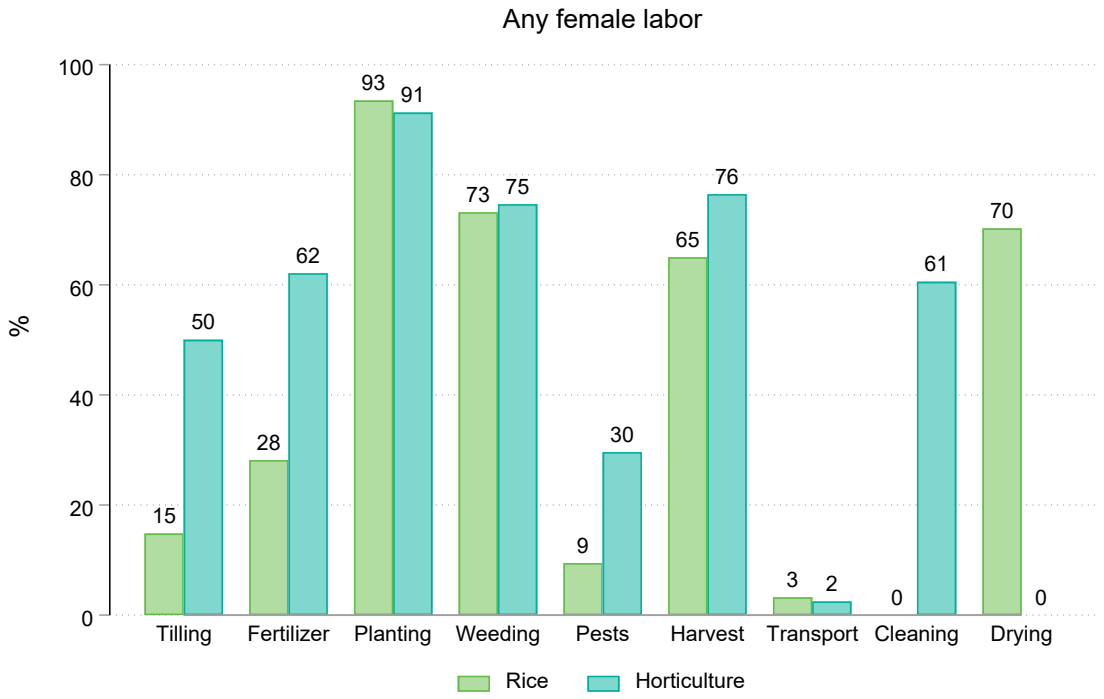
Potential Partner	Product	Location	Reason not Selected
Crowde Partner	Chili	Pasirwangi subdistrict	Already have credit
Indofood partner	potato	Pasirwangi subdistrict	Private credit
Sayur Siap Saji-Vegetables Ready to Serve	Lettuce, Carrot, Cucumber	Cisurupan Subdistrict	Private credit
Agricultural Service Office in Tabanan Regency	Rice	Tabanan regency, Bali Province	Needed more information
The Bloom Garden	Vegetables	Tabanan regency, Bali Province	Poor fit according to project
Pos Banjar Baja Tani Bali	Rice	Gianyar Regency, Bali Province	Poor fit according to project
PT Bali SRI Organik	Rice	Bali province	Asked for greenhouse construction credit (poor fit)
Corn farmers	Corn	Banyuwangi Regency, East Java Province	Did not respond after initial discussion
Credit Union Bintang Timur	Rice	Banyuwangi Regency, East Java Province	Potential interest
Credit Union Sawiran	Rice	Malang Regency, East Java Province	Potential interest

Appendix Table A.7. Correlation between Automated Credit Score and Credit Delinquency, Myanmar Pilot Project

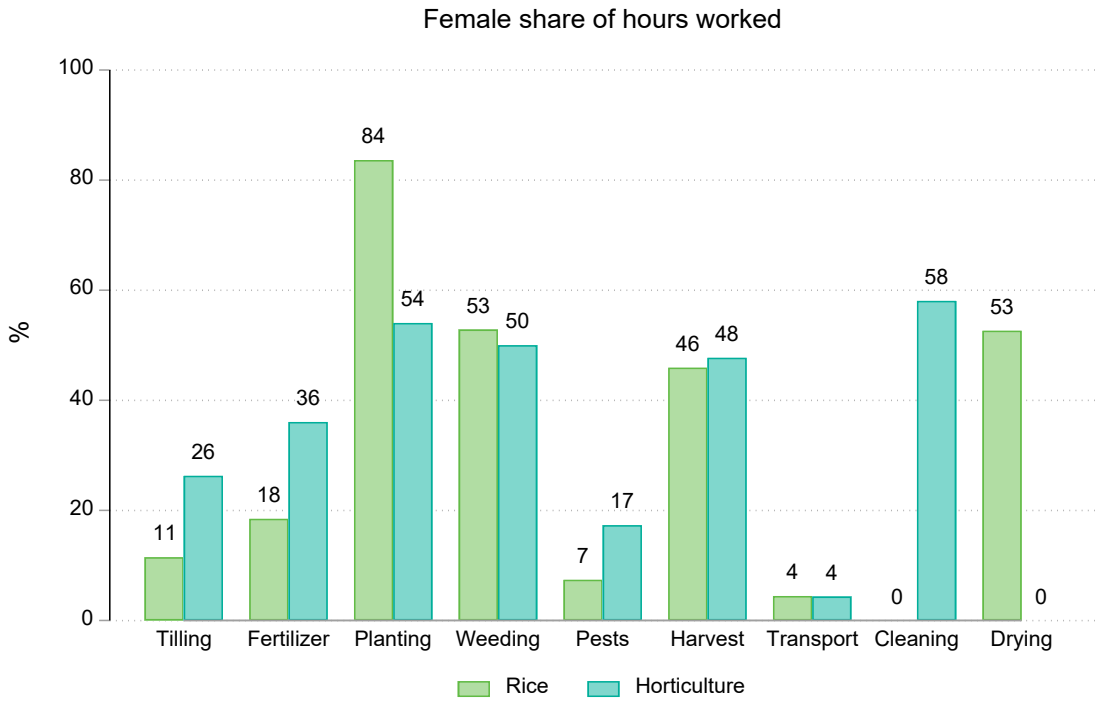
	Delinquency	Delinquency
Credit score	0.000	0.000
	(0.000)	(0.000)
Age		0.012
		(0.010)
Age^2		-0.000
		(0.000)
Male		0.027
		(0.032)
Married		0.033
		(0.034)
Years of schooling		-0.004
		(0.004)
Farmer		0.046
		(0.042)
HH Poverty likelihood		-0.001
		(0.001)
HH size		0.014
		(0.010)
Planted area (acres)		-0.002
		(0.005)
Observations	294	294
R-squared	0.442	0.465
Village FE	Yes	Yes

Notes: Ordinary least squares with standard errors in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively.

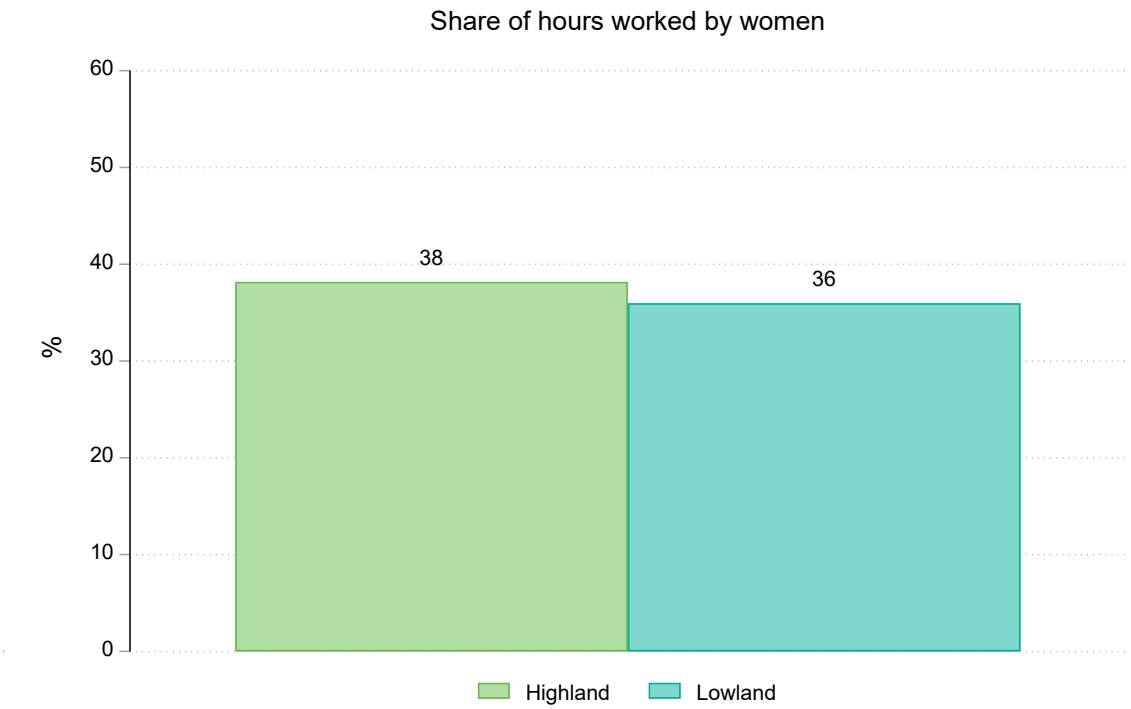
11.2 Appendix B. Additional Figures



Appendix Figure B.1. Percent of Households using Female Labour, by Task and Type of Crop, Gender in Agriculture and Finance Survey, 2023



Appendix Figure B.2. Share of Hours worked by Women, by Task and Type of Crop, Gender in Agriculture and Finance Survey, 2023



Appendix Figure B3. Share of Overall Hours worked by female labourers, Gender in Agriculture and Finance Survey, 2023

11.3 Appendix C. Exploring the Relationship between Conflict and Agricultural Finance in Myanmar

Introduction

Myanmar's agricultural value chains (AVCs) have been significantly affected by conflict, particularly following the 2021 military coup. This study explores the impacts of conflict on the financial behavior of four sets of key stakeholders in the AVCs: rice millers, crop traders, input retailers, and farmers. Finance is widely considered a key input for agricultural production, as it allows for increased efficiency through reallocating resources over time and space. By examining how localized violence affects their credit provision and payment activities this research aims to provide insights for policymakers to mitigate the adverse effects of conflict on food security and economic resilience.

Civil conflict can severely disrupt agricultural activities, which are essential for food security and economic stability. In Myanmar, the military coup in 2021 led to widespread unrest, which has included widespread protests, sabotage operations, and military clashes, throughout the country. Understanding how different stakeholders in AVCs respond to conflict is crucial for developing strategies that enhance resilience.

Data and Methodology

The study constructs unique panel datasets from combining ongoing surveys of rice millers, traders, input retailers, and farmers, with high-resolution data on conflict events from sources including the Armed Conflict Location and Event Data (ACLED) database and proprietary security reports.

The researchers estimate the impact of conflict events at 1-, 2-, and 3-month lags, distinguishing between violent and non-violent events, as well as the intensity of these events (in terms of number of deaths). When studying impacts on farmers, the study distinguishes between planting and harvest season (the seasons when farmers typically seek out, and repay, credit, respectively). Recognizing that the conflict measures in the primary results are somewhat arbitrary, the researchers conduct a machine learning analysis using random forest, to select a smaller set of conflict measures from a large set of variations on how to construct conflict measures, and interactions of conflict events and their intensity.

Results

The research reveals mixed effects of localized violence on credit provision and payment activities across different stakeholders:

1. Rice Millers: These small and medium enterprises experience moderate impacts from conflict. The primary impacts are observed in payments behavior, which concerns their interactions with rice farmers (their suppliers). Impacts of conflict on their own credit access and repayment are much more muted. The study finds complex dynamics in payment relationships, with short-term negative shocks often followed by potential positive effects at 2- to 3-month lags. This is consistent with efforts by business partners to maintain financial resilience or reinforce loyalty, by heightening their repayment efforts in the wake of a conflict event.
2. Traders: Traders exhibit significant, varying impacts from conflict. Non-violent conflicts, such as protests, notably affect loan recovery and traders' credit access and repayment. Interestingly, demand for credit from partner-farmers remains largely unaffected, suggesting the presence of other financing sources or resilient partnerships between traders and farmers.
3. Input Retailers: These stakeholders show resilience to conflict, with limited significant impacts. This resilience is possibly due to their localized operations in villages and regional areas, and strong relationships with local farmers.

4. Farmers: The impacts on farmers are primarily concentrated in the pre-planting and planting seasons when they are most likely to seek financing. While short-run impacts during these periods are adverse, the effects are less pronounced during the harvest season.

The study also employs machine learning techniques to identify the most impactful conflict measures from a richer set of possibilities. It finds that widespread conflict events causing civilian displacement, but not necessarily a high mortality rate, may have the most significant disruptive potential. This underscores the complexity of conflict impacts on AVCs, as events involving large civilian participation, such as protests, can be more disruptive than targeted violent incidents. It is possible that for the agricultural sector, highly violent incidents are known to not be primarily targeting the sector, so it is more disruptive when events emerge that draw in a larger proportion of the population, such as protests or forced displacement.

Conclusions

This research highlights the varied and complex impacts of conflict on Myanmar's agricultural value chains. The findings emphasize the need for targeted interventions to support AVC stakeholders and enhance the resilience of the agricultural sector amidst ongoing political instability. By understanding these dynamics, policymakers can develop strategies that mitigate the adverse effects of conflict on food security and economic stability. The study contributes to the literatures on conflict and development, the literature on agricultural value chains, and the relatively recent strand of research on the civil conflict in Myanmar, which emerged in 2021. It offers valuable insights for enhancing the resilience and adaptability of agricultural systems in conflict-affected regions.

11.4 Appendix D. Selected Survey Forms

11.4.1 Vietnam Qualitative Protocol, Focus Groups and Key Informant Interviews

Introduction

Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) will be conducted as a qualitative component of the endline survey for the IFS4Ag project. The field work will be conducted in the last two weeks of May 2024. See proposed field program below.

1. FGDs will be conducted in the same six villages, using lists of treatment groups (the groups that were offered loans) to develop small, ideally mixed gender groups to understand the factors that hindered loan take-up.
2. KIIs will be conducted for a set of key informants —including village heads, DARD officials, local bank and financial institution representatives, coffee traders, input suppliers and Phuc Sinh personnel—to help develop an understanding of how they perceive prospects for agricultural finance in the near future. Between 8 and 12 key informant interviews are expected.

Appendix Table D.1. Proposed field program – May 2024

Date	Activity
Sunday 19th May	Travel to Son La
20st - Wed 22nd May	Training of enumerators and testing question survey
23rd May	Endline survey, FDG and in-dept interviews in Chieng Ban
25th May	Endline survey, FDG and in-dept interviews in Chieng Dong
26th May	Endline survey, FDG and in-dept interviews in Chieng Ngan
27th May	Endline survey, FDG and in-dept interviews in Chieng VE + Muong Bang
28th May	Endline survey, FDG and in-dept interviews in Na Ot
29th May	Wrap up endline survey, FDG and in-dept interviews from all study sites
01-05th June	Data cleaning, transcribing, preliminary analysis of qualitative data
15th June	Final deliverables

Focus group discussions (FGDs)

The FGG aims to explore the relative importance and contribution of the following reasons why farmers didn't or did take up loans.

Focus group discussions (FGDs) will be used to collect information from groups of men and women fruit growers (approx. 8-14 pax). Six FGDs will be conducted – one in each of the main study villages.

The key research question for FGDs is

What factors contributed to low uptake of loan by coffee farmers in Mai Son District in Son La?

Focus group discussions will have the following format and structure and run between 120-140 minutes.

Appendix Table D.2. Format and structure of focus group discussion.

Section	Time	Theme/topic	FGD format
0	15 min	Welcome, introduction and overview	Men and women together
1	20 min	Reasons why farmers did or didn't take up loans.	Men and women together
2	20 min	Details about current and recent loans and debts	Men and women together
3	20 min	Changes in income and livelihood over the last five years	Men and women together
4	20 min	Gendered attitudes towards financial decision making	Men and women separately
5	20 min	Gendered access and control over financial resources	Men and women separately
6	20 min	Challenges, risks, aspirations, and goals	Men and women separately
7	10 min	Close, thanks and summary	Men and women together

Welcome and introduction.

Facilitated discussion covering the following (10 min):

- Welcome and introduction of team and participants.
- Purpose and overview of FGD
- Rules and etiquette
- Informed consent

Changes in income and livelihood over the last five years

Run as a general facilitated discussion, to determine the relative change in household incomes and livelihood situation over the last 5 years, and the drivers of these changes, and hopefully some links to the need for loans and credit. (20 min)

Household income

- Household income from coffee. Income from coffee as a proportion all sources of income. (range of values). Main other sources of income.
- Changes in income over the last five years.

Perceptions about change in livelihood situation in last 5 years

- Improved, remained the same, decreased.
- Changes in cash, savings, debt situation.
- Change in assets – motorbike, renovate or new house, farm equipment, household electrical items, motorcar, truck,
- Other investments
- Schooling and health care

Explore main drivers of livelihood changes (presumably income?)

Details about current and recent loans and debts

This discussion documents the current and recent situations about household finance, loans, and debt. Run as a facilitated discussion, recording the range and median responses. (20 min)

Households currently with active loans and debts – formal and informal

- Number or proportion of households who currently have loans.
- Number of outstanding debts or loans
- Loan amounts - total amounts.
- Purposes of loans - explore specific reasons
- Source of loan/Lenders (formal and informal
- Ranking of credit and finance sources in terms of their importance (a discussion or quick ranking exercise)
- Advantages and disadvantages of different sources of finance

Changes in access to credit over the past 5 years

Households who had active loans and debts five years ago – formal and informal (or in the last five years)

- Number or proportion of households with loans
- Number of outstanding debts or loans
- Amounts - total amounts
- Purposes of loans - explore specific reasons
- Lenders

Reasons why farmers did or didn't take up loans.

For those people that didn't take a loan

A facilitated session with unprompted and prompted discussion that explores the possible reasons (20 min):

- **Socio-economic circumstances** – recent high coffee prices, have increased revenue from coffee sales, increasing cash flow, allowing household to pay down debts, and reducing reliance on finance for seasonal operating expenses, and investment in upgrading technology?
- **Attitudes to risk -** risk of being indebted and unable to pay back loan; risk the loan won't be used for productive purpose; risk a low return on the loan.
- **Trust attributes -** impact of recent predatory finance scams; lack of trust in VietEd or Viet Post bank in local areas
- **Loan attributes -** interest rate considered too high; loan terms are not favourable – repayment flexibility, loan period, loan amount, collateral requirements; application process to complicated, repayment options; and loan generally not considered attractive or appealing.
- **Other sources of finance available and rank which are most appealing and why.**
- **Influence of existing debts**

Note: Could run as an activity

After a short discussion, this could be run as an activity whereby FGD participants allocate maize seed, or other small objects in proportions according to the relative importance of reasons they didn't take up the loan.

The discussion should then also deeper into the underlying reasons, particularly for loan attributes.

For those people that took a loan, could explore:

- What did they use the loan for?
- Would they take another similar loan, or recommend the loan to their neighbours?
- What did they like or not like about the loan product?
- Did the loan benefit them? How specifically? If not, how did it impact them adversely?

Gendered attitudes towards financial decision making.

General discussion

- Who, between husband and wife is responsible for **financial decisions** in relation to **coffee** production? (Expenditure, savings, repaying debt, taking out loans)
- For household? How are decisions made? Who has most influence and power?

Tool: Decision-making matrix

- *Purpose: To evaluate the differences between men and women in terms of their **participation in decision-making** at household level in relation to coffee production* (20 min)

Types of financial decisions (1)	**Men (2)**	**Women (3)**
At household level		
Household work (e.g. food preparation, child minding, housework, etc).		
Household expenditures, saving and repaying debts		
Obtaining a loan or credit for household purpose e.g. food, renovation, celebrations		
Purchasing coffee production inputs and farm operations		
Coffee sales and marketing		
Investing in new technologies or adopting new practices for coffee production		
Taking out a loan or credit for coffee business, including using land as collateral		

Gendered access and control over financial resources

Tool: Resources and access to resources (20 min)

*Purpose is to understand the differences between men and women in terms of their **access to and control over financial services**.*

Resources and access to resources (1)		Access (2)		Control (3)	
		Men	Women	Men	Women
Access to financial services	Savings account				
	Informal credit (money lender, relatives)				
	Formal loans, credit, saving accounts (VSPB, bank, and people credit union etc)				
	Mobile banking, money transfer services				

Challenges, risks, aspirations, and goals

A facilitated group discussions about the following: (20 min)

- Likely need to borrow money in the next five year. Formal and informal.
- Main risks and challenges facing your household and in relation to growing coffee.
- Aspirations and goals (personal, household, coffee enterprise) in the next 3-5 years.
- Level of confidence about the financial viability of coffee production enterprise in the next 3-5 years

Summing up, thanks and wrap up.

End of Focus Group Discussion

Key informant interviews

Key informant interviews (KIIs) will be scheduled with the following key stakeholders: Village leaders, village coffee collector and traders, Phuc Sinh, private money lender, Lien Viet Post bank representative, Viet Ed, agents of popular local banks (People's Credit, Agri Bank, VSB), DARD and input suppliers. Between 8 and 12 key informant interviews are expected.

In addition to understanding why the loans were not widely taken up, a key research question for the group is their thoughts about prospects for agricultural finance in the relatively near future.

The KII introduction and checklist is provided below.

Introduction and informed consent

- Introduction of project and interviewer.
- Purpose and overview of KII
- Use of data and results
- Informed consent

Guiding questions (checklist)

0. **Details and background of the informant**

1. **Factors that contributed to low uptake of loan by coffee farmers in Mai Son District in Son La?** Refer to reasons provided above? [For people that were aware of the project and loan products].
2. **Views about the prospects for agricultural finance in Mai Son community in the near future.** What types, uses, and features of loans will be required? What type of loan products? Preferences and roles of formal versus informal loans. Value in bundling financial products (loans, saving, insurance). Benefits of electronic and e-banking? Other innovations? Likely customer groups?
3. **Role for value chain financing** or formal institutional loan products? Would you try this scheme (linking Lien Viet Post Bank and off-taker; Phuc Sing) again? What changes would need to be made to make this type of loan more appealing and successful.
4. **What could be changed to improve loan uptake or improve these types of loans for farmers?**

11.4.2 Indonesia Gender Questionnaire

The questionnaire starts on the next page.

INNOVATIVE AND INCLUSIVE AGRICULTURAL VALUE CHAIN FINANCING

WOMEN'S ROLE IN AGRICULTURAL CREDIT ACCESS
(GENDER EQUALITY)

FARMER'S QUESTIONNAIRE: Vegetable/Rice farming*

Name of Respondent	:	……..
Telephone number	:	……..
Sub-village	:	……..
Village	:	……..…….
Farmer's Group	:	KT/KWT ……..
Sub-District	:	……..
Regency	:	……..
PROVINCE	:	……..

Name of Eumerator : _____

Date of Interview : _____

Research Collaboration

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE (IFPRI),

AUSTRALIAN CENTER FOR INTERNATIONAL AGRICULTURAL RESEARCH (ACIAR),

INDONESIAN CENTER FOR AGRICULTURAL SOCIO-ECONOMIC AND POLICY STUDIES (MINISTRY OF AGRICULTURE INDONESIA)

Oct 2023

I. HOUSEHOLD CHARACTERISTICS

1.1. Household Members' Characteristics

No	Name	Gender [1)]	Household status [2)]	Age (years)	Education level [3)]	Job type [4)]		Income from those jobs during the last one year (Rp)	
						First	Second	First	Second
1									
2									
3									
4									
5									
6									
7									
8									

Notes: 1) *1=male; 2=female*; **2)** *1=HH head; 2=wife; 3=child; 4=others;* **3)** *in year, e.g. basic school = 6 years;* **4)** *based on respondent's admittance (job types may be more than one*);

II. FARMING ACTIVITY

Choose the vegetable farming of one land plot in the last cropping season

a. Crop : ..……

b. Area size : ……. m^2

2.1. Cropping pattern, land rent, and share cropping

No	Description	Response
1	Last one year's cropping pattern	
2	Last cropping season practice (mixed cropping/monoculture)	
3.	If renting, how much is the land rent? (Rp per year)	
4.	If the land cultivated is sharecropping, how is it carried out?	
	a. Input costs from the land owner, while labour from the sharecropper	
	b. Input costs and labour from the sharecropper	
	c.	

2.2. FARM COST AND INCOME (one land plot, the last cropping season)

Crop: ……. Land size: ……m^2 Cropping season (MT) ……. 2022/2023

2.2.1. Land tillage

No	**Uraian**	**Value (Rp)**
1	Land tillage method[1)]	
	a. Human labour	
	- Household labour - Male (.....WD x Rp...../WD) ***WD*=working days**	
	- Hired labour - Male (.....WD x Rp...../WD)	
	- Household labour - Female (.....WD x Rp...../WD)	
	- Hired labour - Female (.....WD x Rp...../WD)	
	- Working contract (Male/Female*, not daily basis)	
	b. Machine	
	- Rent (..... x Rp...../area)	
2	Did you apply organic fertilizer? If yes, please mention its brand/type	
	a. ..... (.....kg x Rp...../Kg)	

	b. ..... (.....kg x Rp...../Kg)	
3	Did you apply herbicides? If yes, please mention them	
	a. ..... (.....ltr x Rp...../ltr)	
	b. ..... (.....ltr x Rp...../ltr)	
4	Irrigation method [2)]	
5	Irrigation sources?[3)]	
6	Do you apply water pump for irrigation? Yes/No	
7	If using water pump, how many times in one cropping season ?	
8	How much the irrigation cost in one cropping season? (Rp)	

Fill in with: **1)** *1= Human labour; 2=Tractor (machine);*

2) *1=intermittent; 2=Keep running; 3=Inundated*

3) *1= irrigation channel; 2= river; 3=surface water; 4=well water; 5= pond; 6=others …*

2.2.2. Seed adopted and seedling labour

No	**Item**	Response
1	What was the variety of the vegetable/rice?	
2	Was the seed certified (labelled)?	
3	How many days after planting is harvested?	
4	If the seed was self-produced or exchange with other farmers, how many seasons are already planted?	
5	How many kg/gr/plantlet was seed volume applied?	
	a. Volume (Kg, gr, planlet)	
	b. Price (Rp/Kg, gr, planlet)	
	c. Value (Rp) = a x b	

2.2.3. Planting labour

No	**Item**	**Value (Rp)**
1	Was the planting schedule simultaneously with other farmers adjacent? Yes/No*	
6	Planting labour	
	a. Household labour - Male (.....WD x Rp...../WD)	
	b. Household labour - Female (.....WD x Rp...../WD)	
	c. Hired labour - Male (.....WD x Rp...../WD)	
	d. Hired labour - Female (.....WD x Rp...../WD)	
	e. Working contract: Male/Female* (……. WD)	
	f. Machine labour (…… WD)	

2.2.4. Crop maintenance (weeding, pest/disease control)

No	Item	Respon/Value (Rp)
1	How did you control the weed? Manual/herbicide/plastic sheeting*	
2	Did you replace not growing seed?	
3	Labour for seed replacement? Male/Female*. HH members/hired?	
4	Weeding	
	- Household labour - Male (.....WD x Rp...../WD)	
	- Household labour - Female (.....WD x Rp...../WD)	
	- Hired labour - Male (.....WD x Rp...../WD)	
	- Hired labour - Female (.....WD x Rp...../WD)	
	- Contract labour - Male (.....WD x Rp...../WD)	
	- Contract labour - Female (.....WD x Rp...../WD)	
5	Pest/disease control	
5.1	Mention pest/disease attacked the crop	
5.2	How many times did you control pest/disease in one cropping season?	
5.3	Labour for pest/disease control in one cropping season	
	- Household labour - Male (.....WD x Rp...../WD)	
	- Household labour - Female (.....WD x Rp...../WD)	
	- Hired labour - Male (.....WD x Rp...../WD)	
	- Hired labour - Female (.....WD x Rp...../WD)	
5.4	Pesticide/fungicide/nematicide for pest/disease control	
	- Brand ..... (.....kg x Rp...../Kg)	
	- Brand ..... (.....kg x Rp...../Kg)	
	- Brand ..... (.....kg x Rp...../Kg)	
	- Brand ..... (.....kg x Rp...../Kg)	
	- Brand ..... (.....kg x Rp...../Kg)	
	- Brand ..... (.....ltr x Rp...../liter)	
	- Brand ..... (.....ltr x Rp...../liter)	
	- Brand ..... (.....ltr x Rp...../liter)	
	- Brand ..... (.....ltr x Rp...../liter)	
6	Harvest labour	
	- Household labour - Male (.....WD x Rp...../WD)	
	- Household labour - Female (.....WD x Rp...../WD)	
	- Hired labour - Male (.....WD x Rp...../WD)	
	- Hired labour - Female (.....WD x Rp...../WD)	
	- Contract labour M/F (….. WD)	
7	Post Harvest Labour	

	- Transporting (F/M; family/hired) (….WD x Rp ……./WD)	
	- Cleaning Grading (F/M; family/hired) (….WD x Rp ……./WD)	
	- Drying (F/M; family/hired) (….WD x Rp ……./WD)	
	- Other activities (F/M; family/hired) (….WD x Rp ……./WD)	

2.2.5. Fertilizer application labour

No.	Item	Response
1	How many times were fertilizers applied in one cropping season?	
2	Total labour for fertilizer application	
2a	- Household labour - Male (.....WD x Rp...../WD)	
2b	- Household labour - Female (.....WD x Rp...../WD)	
2c	- Hired labour - Male (.....WD x Rp...../WD)	
2d	- Hired labour - Female (.....WD x Rp...../WD)	
2e	- Contract labour: Male/Female (….. WD xRp ……./WD)	

2.2.6. Fertilizer applied

1	Types/brand, volume, price, value	
A	- Types/Brand ..... (.....kg x Rp...../Kg)	
B	- Types/Brand ..... (.....kg x Rp...../Kg)	
C	- Types/Brand ..... (.....kg x Rp...../kg)	
D	- Types/Brand ..... (.....kg/ltr x Rp.....kg/ltr)	
E	- Types/Brand ..... (.....ltr x Rp.....kg/ltr)	
F	- Types/Brand ..... (.....ltr x Rp.....kg/ltr)	

2.2.7. Harvest, yield volume, price, value

No.	Item	Response/Value (Rp)
1	When was the crop harvested? Date …….	
2	Harvest volume (kg, bunch, ……)	
3	Selling price (Rp/ kg, bunch, ……)	
4	Crop value (Rp)	
5	Shared crop (if share cropping) (Rp)	

2.3. SUMMARY: Cost and Income Analysis *(automatically filled by excel)*

No.	Cost/Income	Unit	Volume	Value (Rp)
A	**Inputs**			
1.	Seed			
2.	Chemical/inorganic fertilizer			
	a.			
	b.			
	c.			
	d.			
	e.			
3.	Organic fertilizer			
	a.			
	b.			
4.	Pestiside/Fungicide			
	a.			
	b.			
	c.			
	d.			
5.	Herbicide			
	a.			
	b.			
6.	Labour			
	a. Land tillage			
	b. Border improvement			
	c. Planting & replanting			
	d. Fertilizer application			
	e. Pest/disease control			

	f. Weeding			
	g. Irrigatigation			
	h. Harvest			
	i. Post-harvest			
	j. …….			
	k. …….			
7.	Land rent			
8.	Shared crop			
9	***TOTAL production cost***	**XXX**	**XXX**	
B	**Production**			
C	**Profit (B-9)**			

3. WOMEN'S ROLE IN AGRICULTURAL FINANCING (GENDER EQUALITY)

3.1. Household assignment

No.	Activity	Husband	Wife	Male children	Female children
1.	Arranging household finance				
2.	Determining credit for non-farming purpose*)				
3.	Determining food types				
4.	Cooking				
5.	Parenting, e.g. child education				
6.	Taking care of children				
7.	Determining furniture purchase				
8.	House interior arrangement				
9.	Cleaning the house				
10.	Maintaining the house				

Notes*): mention : (i) formal/non-formal; (ii) sources; (iii) credit value; (iv) interest rate; (v) credit period (days/months/year)

3.2. Farm business management

No.	Activity	Husband	Wife	Male children	Female children
1.	Managing farm business financing				
2.	Determining crop/livestock/poultry to plant/grow				
3.	Arranging farming time allocation				
4.	Agricultural input purchase				
5.	Determining farm business credit*)				
6.	Receiving and allocating the credit (on behalf of the HH)				
7.	Husbandry (livestock/poultry)				
8.	Selling agricultural product				

Notes *): (i) formal/non-formal; (ii) sources; (iii) credit value; (iv) interest rate; (v) credit period ……

3.3. Social and economic activities

No.	Activity	Husband	Wife	With children (toddler & adult), M/F
1.	Farmer group (KT)			
2.	Women farmer group (KWT)			
3.	Cooperative			
4.	***Arisan*** (regular social gatherings)			
5.	Religion affair activities			
6.	Household Welfare Development (PKK)			
7.	***Gotong royong*** (community's mutual assistance)			
8.	Mourn *(melayat)*			
9.	Wedding party			
10.	Other activities: ……..			

3.4. Educational and job access

a) Do you differentiate educational access for your male and female children? Yes/No. Why? ……
……
b) Do you differentiate daily job assignment educational access for your male and female children? Yes/No. Why? ……
……
c) Do you differentiate job access for your male and female children? Yes/No. Why? ……
d) Does your husband allow you to choose your job? Yes/no

3.5. Health access

a) Are you involved in family planning (e.g., contraception, etc.). Yes/No.
b) If yes: who determines your family planning involvement? Wife/husband
c) If no: who does forbid family planning involvement?
d) Do you plan the number of children in your family? Yes/no. Who does determine the number of children?
e) Are you free to check your health or to get medicine when you are sick? Yes/No.
f) Where do you go for health check/taking medicine?