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AGRICULTURAL FINANCE IN DEVELOPING COUNTRIES

Challenges and Opportunities

Edited by Shahidur R. Khandker and Takashi Yamano

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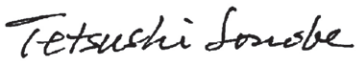
Foreword

Poor people in developing countries are suffering from persistently high food inflation, and concerns about food insecurity are once again dominating policy discussions. To ensure food security, many governments in developing countries are emphasizing the need to increase agricultural productivity, especially among smallholder farmers who face severe challenges from climate change in a fragile environment.

As described in this book, *Agricultural Finance in Developing Countries: Challenges and Opportunities*, agricultural productivity among farmers is strongly linked to financial inclusion. However, the 10 chapters of the book clearly show that smallholder farmers are still credit constrained. Emerging financial services, such as microfinance and mobile finance, help smallholder farmers meet daily needs and payments but are not large enough to help them make long-term investments to improve agricultural productivity and, hence, food security.

Despite these limitations, innovative financial services offer opportunities to expand their reach and depth. For example, mobile finance can reach farmers in remote areas without bank branches and provide loans based on credit scores derived from data collected through mobile phones. I hope that policymakers, stakeholders, and anyone else interested in agricultural finance in developing countries will find this book useful in exploring innovations in agricultural finance.



Tetsushi Sonobe
Dean and CEO
Asian Development Bank Institute

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Executive Summary

Agriculture plays a dominant role in the growth and food security of many developing countries. Thus, raising agricultural investment for raising productivity and ensuring food security constitutes an important policy instrument for meeting Sustainable Development Goals (SDGs) in countries with a high share of agricultural gross domestic product (GDP). Institutional finance plays a catalytic role in raising investment in agriculture. For example, financing can support agricultural diversification, especially in countries with growing demand for high-value food, such as meat and fruits, from the growing urban population in developing countries. Financing is also critical for addressing food security, which has worsened in recent years due to increased volatility in production and agricultural prices caused by climate change. In fact, the predictability of harvests, input availability, and income flows of farmers have worsened in the developing world.

Improving access to financial services provided by banks and other institutions, especially among smallholders, who cultivate more than 80% of farmed land in the developing world, is seen as an important driver for enhancing agricultural investment and productivity in many developing countries. More recent crises due to the supply chain shocks that were caused by the coronavirus disease (COVID-19) pandemic and ongoing wars have drawn policy attention to agricultural finance issues that are critically important for the most vulnerable rural populations of the developing world.

This book discusses major issues surrounding agricultural finance in developing countries, including why agricultural finance is important, who demands and who supplies different kinds of financial services, and what these services' potential roles are in raising agricultural investment and productivity. It also discusses supply and demand constraints affecting agricultural households' access to alternative financial services. Drawing on experiences of major financial institutions in selected middle- and low-income countries, the book also discusses what works and what does not in extending financial services to farmers, especially smallholders in agriculture.

Using both institutional and household survey data, the book focuses specifically on access, impacts, delivery design, and sustainability of expanding institutional finance for agriculture. The book compares different experiences and policy frameworks from a set of four countries in East and South Asia, as well as the regional perspectives of agricultural finance in sub-Saharan Africa and Latin America. A global analysis using the World Bank's Global Financial Inclusion (Findex) data of 2017 from 148 countries is also used to examine cross-country variations in the provision and impact of agricultural finance across households with varying access to financial services.

More importantly, this book seeks to understand what agricultural finance means, particularly to farmers engaged in a risky environment for earning a livelihood and producing foods. The study helps shed light on how borrowing and access to other financial services has evolved over time for agricultural households in developing countries of different regions of the world and with varying levels of economic and financial development, and hence, the broader effects on agricultural investment and overall agricultural productivity and rural welfare.

Given the recent growth in options for providing agricultural finance, has agriculture benefited from innovations and expansion of the financial system as institutions have attempted to extend coverage in rural areas? Are the farmers, especially smallholders, getting the benefits of expansion and innovation policies? Are the past policies still overshadowing the recent innovations of the financial sector?

To answer these questions, the book analyzes recent household surveys from a number of Asian developing countries, where some of the innovations are taking place (both policy- and program-wise). The book also attempts to understand the risks faced by agricultural households, their borrowing patterns, and their consumption and production decisions, and to better understand how improved access to finance can play a role in agricultural transformation for households. The book also has regional and worldwide coverage of the demand- and supply-side issues concerning provision of agricultural finance for the smallholders. In addition, institutional (supply-side) data from selected institutions from a number of countries are used to analyze institutional design and its efficacy in meeting farmers' needs, as well as the institutional efficiency in marketing such products. The role of government and donors is also reviewed within such contexts.

The book utilizes rigorous impact evaluations (non-randomized techniques) using nationally representative household-level panel data to examine the role of agricultural finance in promoting agricultural income and productivity. The varying roles of targeted agricultural development banks and microfinance institutions (MFIs), compared to commercial banks, are addressed systematically to investigate their relative cost-effectiveness in delivering a variety of financial services. While recent work has produced models for agricultural small and medium enterprises, supplemented with country case studies, the main emphasis of this book is on well-designed national-level impact evaluations that have been conducted across countries in order to shed light on how financial products could be better targeted to help support activities of different landholders; small landholders, in particular, are often left out of rural finance. The book also investigates how to make agricultural lending profitable, amid other recent structural policy changes in agriculture across several middle- and low-income countries with changing opportunities for medium and small landholders.

In addition to covering a spectrum of household demand issues concerning borrowing, savings, remittances, and insurance, the country case studies address how agricultural finance issues are handled by banks and other financial institutions, which instruments are cost-effective, and which factors affect returns to agricultural financing by banks and other financial institutions and the efficiency of their agricultural portfolios. The book uses data of financial institutions in selected developing countries and examines the institutional designs that are most effective in targeting agricultural finance to farmers.

Agriculture consists of a broad range of activities from farming for purely consumption (subsistence farmers), to farming for market consumption, and to supply chains including agro-processing and marketing networks, and infrastructural investments including digital technology to support farmers and agencies involved in agribusinesses for agricultural development. Hence, agricultural finance means broad-based financial services (e.g., credit, savings, payments, and insurance) for all categories of stakeholders. Given their diverse demand for different kinds of financial services, financial institutions are expected to meet the needs of all categories of users, producers, and investors.

Agriculture is a risky activity consisting of crop, non-crop, and livestock production, and their processing. Thus, producers, especially smallholder farmers in the developing world, are subject to both covariate and idiosyncratic risk, on top of the seasonality of agriculture. To withstand such risks and to smoothen income and consumption due to seasonality of income and production, farmers, like any other agents of production, must have access to loans, savings, payments, and insurance to support their livelihoods and to enable them to continue agricultural operation in ways that are sustainable for them and others. Thus, providing agricultural finance means facilitating financial services at an affordable cost in a timely manner. Provision of such services also means providing coping mechanisms to help mitigate both idiosyncratic and covariate risks in a cost-effective and sustainable manner.

Cross-country data analysis shows that agricultural productivity (measured by output per hectare) is inversely related to a country's agriculture share of GDP. This inverse relationship is prominent in poor countries of Asia and Africa, meaning that the burden of ensuring a country's food security rests on the smallholders of these regions, who manage the bulk of agricultural production. Agricultural finance, supporting smallholders' needs for financial services, therefore, is critical to transforming agriculture to support a country's sustainable development goals, including attaining food security. Past research also shows that small farmers are much more liquidity-constrained than large farmers in input–output decision making, but they have less access to institutional finance than large farmers. Hence, the policy goal of many governments and development partners is to induce structural shifts in agriculture to raise agricultural productivity and attain food security in the process. As agricultural activity is subject to weather and other risks, agricultural finance, besides providing affordable outlets for credit, savings, and payments, must be able to provide insurance to protect crops and their processing.

Despite the need of agricultural finance for smallholders, few of them have access to institutional finance, such as credit, savings, payments, and insurance. Commercial banks, providing the bulk of financial services in any developing country, seldom provide such services to smallholders, whose need is the highest for increasing farm-level productivity and thus attaining food security. For example, in South Asia, agriculture accounts for some 20% of the GDP but receives less than 8% of the lending by commercial banks.

Since commercial banks have failed to reach smallholders in agriculture, agricultural development banks have been established with government support to cater to the needs of farmers. However, bank lending is subject to production risk, price volatility, climate changes, high transaction costs of providing financial services to agriculture, and lack of physical collateral for many farmers. At the same time, agricultural finance provided by banks and related institutions is low and uncertain because of the same risks and uncertainties that affect agriculture. Thus, smallholder agriculture in many developing countries is largely self-financed.

Farmers' access to institutional finance is also affected by misdirected policymaking that controls not only the pricing of agricultural products and inputs, such as fertilizer, but also interest rate policies and loan repayments of government-supported agricultural development banks. Of course, policies and programs have changed in recent years to address these issues, and it is now evident that farmers' access to financial services has improved due to innovations in policymaking and institutional arrangements. But outcomes vary by region and country depending on the institutional reforms and financial arrangements taken by governments and other stakeholders. Besides banks, other agencies, such as cooperatives, MFIs, and mobile financial services (MFS) have been active in providing financial services to farmers in the developing world.

The book's undertaking of global, regional, and country-level perspectives of both demand for and supply of financial services—including credit, savings, payments, and insurance—demonstrates the reality of agricultural finance in terms of both development and food security as well as changes in policymaking and institutional innovations in meeting smallholders' demand for financial services. The global Findex data analysis confirms that agricultural productivity is strongly associated with financial inclusion in agriculture, with more financial inclusion observed in developed countries, such as those in Latin America, and less access in less developed countries of Asia and sub-Saharan Africa. Data analysis also confirms that support of commercial banks to agriculture is for the rich farmers, while MFS and cooperatives provide support to the smallholders. MFS, while providing essential services such as transfer of funds (remittances and payments), are not very engaged in extending other services such as credit and savings mobilization.

Country-level household data analysis also confirms that credit has a significantly positive effect on farm income, consumption, education, and health for smallholders, but they have limited access to institutional finance. Improved access to institutional finance enhances farmers' resilience by enhancing seasonal cash flows and lowering variations of agricultural income.

Financial inclusion, defined by having an account with a financial institution (banks, MFIs, and MFS), has increased in the developing world. The main contributing factor is mobile financial services, which extend services such as payments and remittance transfers at a low cost and in a timely fashion using the vast network of mobile phone technology. No wonder mobile-based financial services are emerging to draw a greater share of the unbanked population under the umbrella of financial services. Thus, while MFIs and banks find physical distance as a barrier, MFS do not, so MFS extend their services to farmers and nonfarmers equally as per the demand for those services. This is possible due to the vast network of phone technology.

However, MFS are not yet capable of providing other financial services such as credit and insurance, which are critical to enhancing agricultural productivity and food security through innovation and product diversification. On the other hand, MFIs use local networks to expand their coverage of financial services at a lower loan default cost, but they hardly use digital methods such as mobile-based technology to expand credit and other services, which can help reduce the transaction costs of handling these services. Hence, innovations are essential for promoting linkages of mobile- or internet-based technology with agricultural financing being provided by banks and MFIs. Government and donors may facilitate digitizing agri-finance and must play a facilitating role in this context.

More specifically, governments must help promote alternative institutions with appropriate incentives by combining bank finance, microfinance, and mobile finance. This must be based on the understanding that a single type of finance may not address the needs of each and every farmer and other stakeholders engaged in agriculture. Innovative approaches, including development of nonfinancial instruments such as digital technology, or financial instruments such as the least developed insurance products, are necessary for agricultural development.

International development partners along with country governments must support these innovative approaches and help integrate a variety of disparate financial ecosystems to make them replicable and accessible in a cost-effective manner to provide smallholders with financial services they need most which are affordable and easily accessible. International actors such as the World Bank along with regional partners such as the Asian Development Bank (ADB) may consider creating an international agricultural financial system such as an International Agri-Bank (IAB) to support the growth of an affordable and easily accessible financial ecosystem in the developing world to meet the challenges of this century's global food security and climate change issues.

CHAPTER 1

How Agricultural Finance Matters for Development: An Overview

Shahidur R. Khandker and Takashi Yamano

1.1 Introduction

The role of agricultural finance in overall development can hardly be overemphasized. Higher agricultural investment for raising productivity is an important policy instrument for meeting sustainable development goals in countries with a higher share of agricultural gross domestic product (GDP). Institutional finance can stimulate private investment in agriculture.[1]
For example, finance can support agricultural diversification, especially in developing countries whose growing urban populations lead to increased demand for high-value food such as meat and fruit. Agricultural finance can also play a role in addressing food security in developing countries. The recent increased volatility in agricultural prices due to changing climate and rainfall patterns has raised major concerns about food security in developing countries and has placed increasingly complicated financial constraints on agricultural households and agribusinesses (FAO 2016). In fact, predictability of harvests, input availability, and income flows have all worsened for farmers in the developing world, especially among smaller producers who are already burdened with uncertainty in agricultural production and marketing. Improving access to agricultural finance, especially among smallholders, is thus considered an important driver of raising agricultural investment and higher farm productivity (e.g., World Bank 2015). More importantly, food insecurity due to the supply chain shocks caused by the coronavirus pandemic and Russia's war in Ukraine has been a major source of havoc in the policy arena across the world. This has drawn particular attention to agricultural finance issues related to the most vulnerable rural populations in the developing world.

[1] This does not mean that informal finance has no role in agriculture. However, informal finance, which tends to occur on a short-term basis, cannot support investment in technology, irrigation, and other modern inputs to augment agricultural productivity (World Bank 2015).

This book discusses the major issues surrounding agricultural finance in developing countries, including why agricultural finance is important, who demands and who supplies different kinds of financial services, and what these services' potential roles are in raising agricultural investment and productivity. The book also discusses supply and demand constraints affecting agricultural households' access to alternative types of financial services. Drawing on experiences of major financial institutions in selected middle- and low-income countries, the book also discusses what works and what does not in extending financial services to farmers, especially smallholders.

More specifically, using both institutional and household survey data, the book focuses on access, impacts, delivery design, and sustainability of expanding institutional finance. The book compares the different experiences and policy frameworks from a set of four countries in East and South Asia, as well as the regional perspectives of agricultural finance in sub-Saharan Africa (SSA) and Latin America and the Caribbean (LAC). A global analysis using the World Bank's Global Financial Inclusion (Findex) Database reveals variations between countries in the provision and impact of agricultural finance across households with varying access to financial services.

This book examines specific country and regional experiences, over several years, with the role of agricultural finance through different policy instruments in addressing the financial constraints, productivity, and welfare of agriculture-dependent households. As opposed to case studies, the country experiences in this book are based on empirical analyses of nationally representative household data with detailed modules on agriculture and household members' access to and use of financial products such as credit. In most cases, these analyses take the form of nonexperimental identification approaches using panel data over several years. Besides the country case studies, which are drawn primarily from Asia, there are two regional case studies: one from SSA and the other from LAC. The regional case studies provide narratives of agricultural finance practices in those two regions that may be illustrative for Asia. The book includes a cross-country analysis of 148 countries, using the 2017 round of the World Bank's Global Findex survey.

This book seeks to understand what agricultural finance means, particularly to farmers engaged in a risky environment for earning livelihoods and producing food for others. The study helps shed light on how borrowing and access to other financial services has evolved over time for agricultural households in countries in different regions of the world and with varying levels of economic and financial development—and hence the broader effects on agricultural investment and overall agricultural productivity and rural welfare.

The book also seeks to understand demand- and supply-side issues faced by financial institutions, including microfinance institutions, seeking to broaden their lending portfolios. This focus complements the detailed case studies of financial instruments for agriculture that have been presented through the International Food Policy Research Institute's 2020 Vision Initiative (see Hill and Torero 2009; Kloeppinger-Todd and Sharma 2010).

1.2 The Book's Research Issues

Given the recent growth in options for providing agricultural finance, has agriculture benefited from the innovations and expansion of the financial system intended to extend coverage in rural areas? Are farmers, especially smallholders, getting the benefits of expansion and innovation policies? Are the past policies still overshadowing the recent innovations of the financial sector?

To answer these questions, the book analyzes recent household surveys from a number of Asian developing countries where some of the innovations are taking place (both in policy and programs). This analysis examines the risks faced by agricultural households, these households' borrowing patterns, and their consumption and production decisions to better understand how improved access to finance can support agricultural transformation for agricultural households of varying income levels. The book also has regional and world-wide coverage of the same demand- and supply-side issues concerning provision of agricultural finance to smallholders. In addition, the book uses institutional (supply-side) data from selected institutions in a number of countries to analyze institutional design and its efficacy in meeting farmers' needs, as well as the institutional efficiency in marketing such products. The book also reviews the role of government and donors within such contexts.

The book utilizes rigorous impact evaluations (using non-randomized techniques) of nationally representative household-level panel data to examine the role of agricultural finance in promoting agricultural income and productivity. The book also systematically addresses the varying roles of targeted agricultural development banks and microfinance institutions (MFIs) as compared to commercial banks. While recent work has produced models for agricultural small and medium enterprises, supplemented with country case studies, the main emphasis of this book is on well-coordinated, national-level impact evaluations that have been conducted across countries in order to shed light on how financial products could be better targeted to help support activities of a variety of landholders; small-sized landholders, in particular, are often left out of rural finance. The book also examines how to make agricultural lending profitable, amid other recent structural policy changes in agriculture across several middle- and low-income countries that are changing opportunities for medium and small landholders.

In addition to covering a spectrum of household demand issues concerning borrowing, savings, remittances, and insurance, the country studies address how agricultural finance issues are handled by banks and other financial institutions, which instruments are cost-effective, and which factors affect returns to agricultural finance for banks and other financial institutions and the efficiency of these institutions' agricultural portfolios. The book uses data from specific financial institutions in selected developing countries and examines the institutional designs most effective in targeting agricultural finance to farmers.

The studies carried out for the book cover four diverse countries of Asia (Bangladesh, India, Thailand, and Viet Nam) and use nonexperimental empirical methods and household-level data to address the following:

- Can finance play a role in agricultural transformation? How are households that borrow for agriculture different from households that do not borrow (or that borrow for other purposes)? Are observable differences related to access or demand issues?
- What kind of financial products affect agricultural households most, and how?
- What are the distributional correlates of borrowing for agriculture (for example, by household income or other indicators of vulnerability)?
- What is the most cost-effective way of reaching agriculture-dependent households and meeting both their short- and long-term needs for financial services, including credit?

The book also utilizes institutional-level data to examine the profitability and sustainability of alternative rural financial institutions to address inclusive finance in agriculture, focusing on the following issues:

- trends in institutional finance in terms of coverage of rural areas, especially smallholders;
- nature and scope of different financial products developed and delivered;
- extent to which incentive structures of financial institutions have evolved over time to extend services to rural areas;
- relevance of interest rates charged by financial institutions for various financial products;
- extent of profitability of agricultural portfolios;
- cost-effectiveness of financial inclusion strategies for the design and delivery of financial services; and
- level of importance of certain incentives for institutions to innovate and expand coverage of financial products, specifically those needed for agricultural households.

The book also extends the country-level analysis to two regional studies (SSA and LAC) to provide a snapshot of the lessons learned on agricultural finance from these two regions and what they mean to the experience of Asian country perspectives. Besides country-level in-depth and regional studies, the book also presents a cross-country study using the 2017 rounds of the Global Findex data of the World Bank. This provides a snapshot of the global status of financial inclusion in agriculture, covering issues related to both constraints and the status of various measures of financial inclusion with possible impacts on agricultural productivity. With this introduction, we provide an overview of the issues evaluated in this book.

1.3 What Is Agricultural Finance?

Agricultural finance often refers to agricultural credit, but it is actually more than credit. It also includes savings, payments, and insurance. Farmers, for example, need not only credit but also a reliable outlet to save, pay bills, and buy insurance to mitigate risk in agricultural production (crop production plus poultry and livestock raising). Farmers, especially smallholders in agriculture, are only one of the groups of stakeholders associated with agriculture.

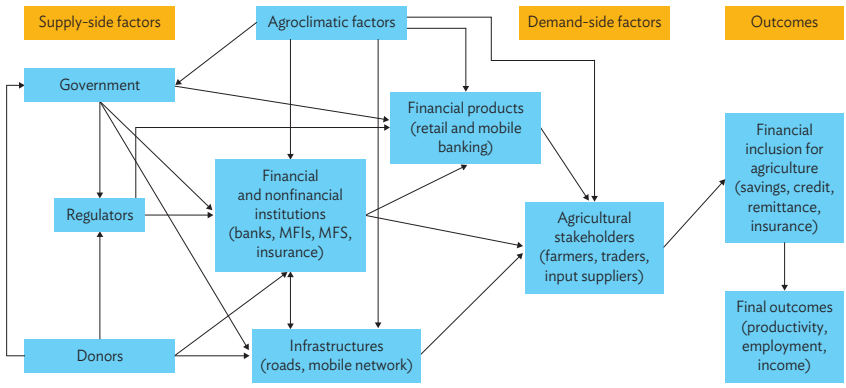
Agriculture consists of a broad range of activities from farming purely for self-consumption, to farming for market consumption, supply chains including agro-processing and marketing networks, and to infrastructural investments including research and development to support agriculture and a variety of related products and their needs. Thus, agricultural finance means broad-based financial services (credit, savings, payments, and insurance) for all categories of stakeholders. Like smallholders involved in farming, other stakeholders such as traders, processors, input suppliers, and value chain-makers are also associated with agriculture in different ways and thus also need a variety of financial services for the sake of supporting agriculture's growth and productivity.

Given stakeholders' diverse demand for different kinds of financial services, agricultural finance is expected to meet the needs of all categories of users, producers, and investors. In other words, agricultural finance can be defined as financial inclusion for agriculture, where financial inclusion is measured by a farmer, a business, and an investor having access to and use of financial services to facilitate saving, borrowing, making payments, and buying insurance to mitigate production and non-production (e.g., marketing) risks involved in agricultural activities (e.g., see general discussion on financial inclusion in Demirguc-Kunt and Klapper 2012; Demirguc-Kunt et al. 2015; World Bank 2018).

To conceptualize better how we define agricultural finance, Figure 1.1 presents the theory of change underlying interrelationships between supply- and demand-side factors defining and influencing agricultural finance. In this framework, agricultural finance is an outcome determined by a host of factors/actors from both demand and supply sides as well as independent policymakers outside of agriculture plus some agroclimate and other risk factors affecting agriculture and agricultural finance independently as well as jointly. Agricultural finance in turn affects the ultimate outcomes of policy concerns, such as those related to individuals and businesses.

As Figure 1.1 suggests, three major stakeholders influence the levels and categories of agricultural financial outcomes: (i) policymaking bodies such as government, regulators, and donors; (ii) financial institutions such as banks and nonfinancial institutions such as insurance companies; and (iii) users of agricultural finance (e.g., farmers and businesses). The goal of any policymaking is to define and support agricultural finance (financial inclusion for agriculture, for example) that meets the demand for alternative categories of financial services and thus can influence the ultimate outcomes such as productivity, employment, income, and consumption.

Figure 1.1: Interrelationship Between Supply- and Demand-Side Factors Influencing Agricultural Outcomes



MFIs = microfinance institutions, MFS = mobile financial services.

More specifically, the demand-side factors affecting agricultural finance consist of the demand of a host of stakeholders such as farmers, traders, input suppliers, and value-chain processors. Supply-side factors, as mentioned above, include financial institutions (such as banks and MFIs) as well as nonfinancial ones (e.g., insurance companies). Supply-side factors also include providers of infrastructures such as digital technology, input–output markets, roads, and other types of physical services. Together, based on the demand of various agricultural stakeholders, they create an ecosystem for providing a variety of financial products such as retail and mobile banking.

Of course, the demand for financial products would differ by different types of producers, users, and other stakeholders; hence, broad categories of agricultural financial services must be available to meet the demand of various categories of farmers (large, medium, small, and marginal farmers), input and output traders, processors, and intermediaries involved in creating the value chain of agriculture. In the end, the observed outcomes associated with different kinds of financial services are jointly determined by both supply-side and demand-side factors (as seen in Figure 1.1).

The three major actors of policymaking bodies—government (e.g., ministry of finance), regulators (e.g., central banks), and donors (e.g., Asian Development Bank and World Bank)—provide the ultimate impetus to define a framework for financial and nonfinancial institutions to play an effective role in creating an environment for generating different types of financial and nonfinancial services, given the variety of demand for financial services by stakeholders of agriculture. In fact, demand for and supply of financial services reinforce each other, and policymaking bodies must help facilitate providers to meet the demand for financial services as perceived by the users.

One key independent factor directly affecting the decisions of all categories of stakeholders (and hence agricultural finance and its induced impacts on ultimate outcomes) is the agroclimatic endowment such as rainfall and uncertainty in weather patterns.[2] For example, the seasonality of agriculture governs the agricultural decisions of producers, processors, and investors. This seasonality thus influences how regulators/government/donors determine appropriate agricultural financial services (and how to generate them) to meet the demand for financial services. Hence, external forces such as agroclimatic endowments, including climate change as well as rainfall, play an important role in determining agricultural finance as practiced in a given context. Similarly, institutions and policymaking bodies of the government matter greatly in defining agricultural finance and its development in a given country. In sum, context matters, so defining and supporting agricultural finance must consider these factors while formulating policy by recognizing the varying patterns of financial demand that exist in a given country and a given region as well as across countries and across regions.

[2] A recent report has identified four more risk factors, besides the production risk caused by weather and climate factors: (i) human risk, such as health; (ii) institutional risk, such as government interventions; (iii) price or market uncertainty; and (iv) financial risk, such as lack of access to capital (Bakst and Wright 2016). Figure 1.1 covers all these factors except the personal and health factors, which can be influenced by the same factors affecting other categories of risk factors. However, as part of agricultural finance, crop and weather index insurance plays the most critical role in agricultural policymaking (see Robles 2021).

1.4 Why Agricultural Finance?

By definition, agriculture is a risky activity. Farmers are exposed to both idiosyncratic and covariate risk, besides the seasonality of agriculture. In order to withstand such risks and to smooth income and consumption through the seasons, farmers must have access to credit, savings, payments, and insurance to support their livelihood and continue their agricultural operation in sustainable ways. This is what agricultural finance is all about. Agricultural finance means providing a credit and savings outlet to save and borrow as per need, facilitating payment and transfer to help pay bills and receive transfers and remittances, and extending insurance to protect farmers against calamities due to external factors. For example, when farmers are subject to covariate risk, they must have access to resources beyond their family and others living in the same community, as everyone in the area is subject to the same risk affecting agricultural operation. Agricultural finance is meant to facilitate such arrangements at an affordable cost in a timely fashion. Agricultural finance is meant to provide a coping mechanism to help farmers mitigate both idiosyncratic and covariate risks in a sustainable manner.

The major thrust of any policymaking that involves agricultural finance is the extent and significance of the ultimate impacts of the finance on agricultural and nonagricultural productivity and other socioeconomic outcomes of major policy interest, as shown in Figure 1.1.

How do we know that agricultural finance has sizeable and significant impacts? There is a large literature using micro-data and econometric analysis showing that financial inclusion in general leads to improved income, productivity, consumption, nutrition, and education (Cull, Ehrbeck, and Holle 2014; World Bank 2018). For good reasons, therefore, policymakers advocate for financial inclusion as a key factor in development. The Universal Financial Access initiative introduced by the World Bank in 2012 precisely emphasizes the need for financial inclusion—the need for every individual and business involved in both agriculture and nonagricultural activities to have at least a simple transaction account with a financial institution (e.g., Demirguc-Kunt and Klapper 2012; World Bank 2017). The financial institution could be a bank, a regulated institution such as a credit union, an MFI, or mobile financial services (MFS).

Why does a simple transaction account matter? Having such an account allows people to save money and to send and receive payments; it also is a way for people to access other categories of financial services, such as credit and insurance. The World Bank's Global Findex data over the years show that some 76% of adults worldwide reported having an account with a financial institution in 2021, compared to 51% in 2011, 62% in 2014, and 63% in 2017, with an increase of 50% over that 10-year period (Demirguc-Kunt et al. 2015; World Bank 2021). Organisation for Economic Co-operation and Development economies have almost universal financial inclusion (95%), but coverage remains limited in developing countries (71%) and varies by countries' degree of financial and economic development.[3]

Thus, financial inclusion seems indispensable for financial and overall economic development. However, it may not always be the case that economic development ensures financial inclusion or financial inclusion necessarily promotes economic development. For example, in Viet Nam, the country enjoyed rapid economic development with relatively modest levels of financial inclusion.[4] In contrast, in Uganda, financial inclusion is relatively high even with a low level of economic development.[5] Yet, because a good financial system facilitates efficiency in business transactions and input–output decision making to run an economy smoothly, there is a clear case to argue for better access to all categories of financial services that can enable people (such as farmers) and businesses to save, borrow, pay, and buy insurance against all sorts of hazards affecting their economic viability. More importantly, ordinary and poor people, such as smallholders in agriculture, could be much better off if efforts were made to include them in the financial ecosystem in the first place. That is, financial inclusion is a necessary condition for running an economic activity in a modern economic system irrespective of whether economic development leads to financial inclusion or vice versa.

[3] In developing economies, the percentage of adults having a financial account increased from 63% in 2014 to 71% in 2021, largely due to expansion of coverage due to mobile financial services (World Bank 2021).

[4] See this book's Chapter 4 on Viet Nam.

[5] See this book's Chapter 7 on the regional analysis of SSA.

By extension, if financial inclusion is an important contributing factor for development, financial inclusion for agriculture must also play a critical role for agricultural development. No doubt, agriculture is a risky activity due to risky agroclimatic endowments of a country; yet it provides basic food and essential products for attaining food security and higher economic development. This means a country's overall development can depend on agricultural development, which in turn can depend on financial development, particularly farmers' better access to financial services (credit, savings, payments, and insurance) for managing risk in agricultural diversification and technology adoption.

Country-level data analysis clearly shows that agricultural productivity (measured by output per worker) is inversely related to a country's agricultural share of GDP (e.g., Khandker 2021). However, this inverse relationship between productivity and agriculture share in GDP is only prominent in poor countries of SSA and South Asia, but not so much in economies with a developed agriculture with greater agricultural diversification and higher private investment in agriculture across Europe and Central Asia, East Asia and the Pacific (EAP), and LAC. As 80% of the farmland in sub-Saharan Africa and Asia is managed by smallholders,[6] the burden of raising food production and farm productivity for supporting sustainable growth via raising investment squarely rests on smallholders (FAO 2012).

How does agricultural finance work? Farmers may need to borrow to buy inputs, such as seeds and fertilizer, when they do not have sufficient funds to buy them. Farmers may also borrow to smooth income or cash flows for short-term needs or to purchase physical assets such as land for long-term needs. Other financial products can include deposit services or insurance for health or weather shocks. Access to such financial services can enable farmers to use farm resources that allow them to more efficiently use inputs such as fertilizer, pesticides, and irrigation. Access to financial services can also help producers purchase machinery and equipment to support high-value production and crop diversification. Finally, agricultural finance is key to the marketing and transportation of agricultural products, both agricultural produce and processed goods (World Bank 2015).

[6] While the interpretation of "smallholder" can vary across countries, FAO (2012) defines a smallholder as working on up to 10 hectares.

Ideally, agricultural finance should be able to address needs at all stages of farm-level decision making, from farming and post-harvest management and processing to marketing and distribution. Also, agricultural finance, especially for smallholders, is critical for transforming subsistence agriculture into commercialized agriculture (indicating a higher degree of market-based production) for supporting a country's sustainable development goals.[7] Household surveys show that agricultural finance is more important for smallholders than for large farmers because large farmers are not as constrained by liquidity as smallholders are in making decisions about their inputs and outputs; yet smallholders who cultivate more land do not often have better access to financial services provided by a country's financial institutions (FAO 2012).[8]

The food security and poverty implications of raising food production and agricultural productivity in low-income countries are also significant. Given that about 70% of the world's poor live in rural areas and that most of these rural populations are actively engaged in agricultural activities, improving agricultural productivity and profitability in developing countries are major objectives for promoting sustainable development by both donors and governments (World Bank, FAO, and UN 2010). These goals include inducing structural shifts in agriculture to raise agricultural productivity and attain food security in the process.

Insurance addressing farmers' need to protect crops against weather and other risks (such as pesticides) is considered an important instrument of agricultural finance, but this is the least developed area of agricultural finance for a variety of reasons.

[7] This does not mean that all farmers will be commercialized as a result of better access to financial services. There could be commercialization with land consolidation for some smallholders; others may opt out of agriculture for better options in urban locations and the nonfarm sector. For example, in Mexico, it is possible that most subsistence farmers are not going to make this transition: they will gradually shift away from agriculture, leaving a relatively small number of commercial farms (see Chapter 8 of this book on LAC).

[8] This begs the question of what proportion of land is cultivated by farmers who are credit constrained or do not have access to an adequate range of financial services. This lack of evidence argues for more analysis using farm-level survey data to measure farmers' access to financial services or the extent of financial inclusion in agriculture, especially among smallholders. Research also needs to figure out the current status of financial inclusion in a country and why financial institutions have failed to address the financial service needs of farmers, especially smallholders. The following sections address some of these issues that are covered in the book.

The most important factors inhibiting the growth of farm-specific crop insurance against weather, for example, are the familiar moral hazard and adverse selection issues.[9] In such a situation, indexed insurance such as insurance based on average rainfall in the area has been introduced in several countries, but it is still a subject of uncertainty due to low take-up rates and unavailability of insurance as per needs of the farmers (see Robles 2021). There are some recent attempts to introduce agricultural insurance products using digital means.[10]

1.5 How Do We Know Agricultural Finance Matters?

Country-level macro data analysis does not necessarily help understand whether financial inclusion in agriculture matters in improving a country's agricultural investment and productivity. The observed relationship between access to financial services such as credit and agricultural productivity or GDP merely shows an association between access to finance and agricultural productivity. Measuring whether financial services matter in agriculture by raising farm investment and productivity involves a subtle issue of what is called the endogeneity of farm household decision-making processes. That is, it is difficult to identify whether financial inclusion in agriculture matters because a farmer's decisions about agricultural inputs and outputs can be affected by the same factors that affect a farmer's decision to access financial services (e.g., borrowing) from a financial institution or a lender's decision of whether they would lend to farmers and at what cost.

In a macro setting, such an endogeneity issue is not observable, so we need surveys of farm management or farm households. Yet farm household surveys do not allow us to resolve the joint dependence of decision making because farmers' agricultural input–output decisions may not be conditioned by the availability or access to financial services. Resolving this identification problem is the key factor in determining whether farmers' access to financial services matters and how it matters in agriculture and the well-being of a society.

9 Moral hazard means insurance providers do not know for sure in the case of crop failures whether it is weather that affected the crop production or farmers who have not taken timely measures sufficient to protect crops against weather or other shocks. In contrast, adverse selection crops up where only the most risk-prone farmers would like to purchase insurance.

10 This is discussed more in Chapter 9 of this book.

To exemplify the issue, consider the case of farmers' access to credit. In theory, credit access may not affect agricultural investment and productivity unless farmers are liquidity constrained (e.g., Feder et al. 1990; Karlan et al. 2014). That is, if farmers are not liquidity constrained in input–output decision making, they do not need to borrow from a financial institution in order to invest in agriculture. So, the estimated impact of liquidity (whether it is from savings or borrowing from a bank) in agricultural productivity cannot precisely identify the net impact of access to finance. This is the case of an unconstrained decision-making regime.

But when farmers are liquidity constrained, they are under a constrained decision-making regime in which credit access does directly affect agricultural decision-making processes such as input use and farming practices. Even with a credit-constrained regime, it does not necessarily follow without further assumptions that credit access induces an effect on agricultural productivity, as a farmer's borrowing decision is not made independently of the farmer's knowledge about potential effects on productivity. Resolving endogeneity involves estimating the demand for financial access as part of a farmer's investment decision and then its consequential effect on agricultural investment and productivity. Various methods (e.g., randomized controlled trials, propensity score matching, and instrumental variables) are available that one can use to resolve this endogeneity issue in estimating credit effects (for details, see Khandker, Koolwal, and Samad 2010).

Studies using non-randomized methods have attempted to pinpoint the causality between agricultural finance and productivity in agriculture (e.g., Binswanger and Khandker 1995; FAO 2012, 2017; Feder et al. 1990; Giné and Yang 2009). A review of recent studies using alternate methods has shown that financial inclusion has positive effects on income, productivity, consumption, education, health, and other indicators of well-being (e.g., Cull, Ehrbeck, and Holle 2014). In particular, financial inclusion can help mitigate risks in production through enhanced investment and reduced costs of easing credit constraints in production. This body of literature also suggests that higher access to and use of financial services by farmers can help increase the use of modern inputs and technology, and investment in agriculture, leading to higher farm productivity and income and hence improved household welfare.

Researchers have also observed that credit's effect depends on the extent of credit constraints encountered by farmers (e.g., Feder et al. 1990). Studies from Peru show that credit constraints lower the value of agricultural output substantially

for poor households; however, for those households without credit constraints, productivity is independent of such endowments as land and liquidity (Boucher, Alemu, and Trivelli 2009; Guirkinger and Boucher 2008). Some other studies also confirm that credit constraints affect agricultural output and productivity (Feder et al. 1990; Sial and Carter 1996), farm profit (Carter 1989; Foltz 2004), and farm investment (Carter and Olinto 2003).

A set of articles that used randomized controlled trials (RCTs) conducted in six countries explored the role of financial constraints in poor households' income earning potential, including the effects of microcredit (Banerjee, Karlan, and Zinman 2015). Some of the country studies find a positive impact of credit access on agricultural productivity. Another study using RCT design shows that farmers' investment decisions are very much conditioned on their financial environment (Karlan et al. 2014). The provision of insurance leads to significantly larger agricultural investment and riskier agricultural production choices. Therefore, the binding constraint to farmer investment is not necessarily a lack of access to credit but insurance to mitigate uninsured risk. Thus, extending insurance ensures better utilization of and higher demand for credit and other categories of financial services. But, as the literature shows, indexed insurance has failed to mitigate production risks because it has had low take-up where it has been introduced and because it is not available at all in many contexts due to implementational issues and other complications (e.g., Robles 2021).

The potential heterogeneity of effects across different types of farmers is highlighted in a recent study by Beaman et al. (2015), who randomly introduce agricultural loans to a set of villages; they also introduce cash grants in no-loan villages and among non-borrowers in the loan villages. Higher agricultural investments are observed among cash grant recipients in no-loan villages than among their comparison group in loan villages, indicating that farmers who choose to borrow in loan villages have higher marginal returns on investment. Furthermore, farmers who choose to borrow in loan villages also have higher returns to capital prior to borrowing—greater landholdings, input expenditures, outputs, and profits. The overall evidence is clear: agricultural financial services of different products are generally positively but modestly related to farm household production, income, consumption, food security, and resilience (e.g., Biscaye et al. 2015). That is, agricultural finance matters in various ways to farmers and the businesses associated with agricultural production.

1.6 Current State of Agricultural Finance

Even with large payoffs from financial inclusion in agriculture, the financial services extended to agriculture in developing countries are very limited. For example, in Africa, less than 1% of commercial lending goes to agriculture (IFC 2013). Indeed, commercial banks lend a small share of their portfolio to agriculture compared to agriculture's share of GDP. In 2015, agriculture accounted for 24.4% of GDP and received only 5.1% of commercial lending in SSA (Khandker 2021). In contrast, in EAP, agriculture accounted for 13.2% of GDP but received 5.6% of commercial bank lending in the same year. Consequently, agricultural lending of commercial banks accounted for 9% of agricultural GDP in SSA compared to 47% in EAP in 2015. In South Asia, agriculture accounted for 19.8% of GDP but received 7.8% of commercial lending, with commercial bank credit equivalent to 24% of agricultural GDP. These findings clearly show the limited role of institutional finance in regions where agriculture accounts for a relatively large share of the economy.

The financial underdevelopment in the least developed regions poses a major challenge to agricultural transformation and development. Financial institutions, which are otherwise engaged in urban and industrial sectors, often appear reluctant to extend financial services to agriculture for a variety of reasons, including production risk (due to drought, excessive rainfall, and lack of physical collateral, as many farmers do not own the title to the land they cultivate), and price volatility resulting from global climate change–driven production variations (World Bank 2015).

Financial inclusion in agriculture varies to some extent by degree of commercialization in agriculture, size of farm holding, and level of rural development, including infrastructural development. Different financial instruments (such as savings, credit, payments, and insurance) exist to respond to farmers' different needs, but the financial instruments available to farmers are limited by the level of a country's financial development (e.g., Ruete 2015). A growing body of literature sheds light on the interdependence between agricultural development and financial development that is inclusive of and friendly to smallholders (e.g., IFC 2013; World Bank 2015).

However, the agricultural portfolios of financial institutions are depressed by the same risks and uncertainties that affect agriculture, including information asymmetries and market failures embedded in many rural lending schemes that include regulated interest rates and uncompetitive banking practices.

Reliable and appropriate financial instruments in developing countries can only be developed through financial innovations supported by government and international development agencies.

Agricultural finance matters more for developing countries with a higher share of agriculture in GDP, and accordingly, it matters more for the smallholders who cultivate 80% of land in Asia and sub-Saharan Africa. Yet financial inclusion is limited in scope and design for agricultural households, especially smallholders, and efforts of governments and donors are not quite effective in designing and implementing cost-effective delivery systems of inclusive finance for agriculture.

Recently, governments and international development agencies have made some efforts to expand financial services to farmers in developing countries. The World Bank support to agriculture and related sectors, for example, has increased in aggregate by 70%, from an annual average of $4.1 billion in FY2006–2008 to $7.0 billion in FY2010–2012 (World Bank 2013). In 2013, investment was projected to ramp up to $10 billion by 2015, including an increase in agricultural lending to Africa by $3 billion a year for the medium term (World Bank 2013).

Strengthening farmers' links to markets and financial institutions, particularly among small- to medium-sized landholders, who are more likely to be poor, has formed an important component of such international efforts.[11] Until recently, smallholder agriculture in many developing countries has remained largely self-financed. As many farmers are liquidity constrained, improved access to institutional finance, including sources of microfinance as well as commercial and agricultural bank finance, can help rural households to smooth risks and

[11] Farmers' improved market access through contract farming is getting increased attention from policymakers in this globalized world where demand for food and other agricultural products has increased tremendously. The use of contract farming is a way to facilitate such enhanced demand for food and other products via linking farmers to the ultimate users. Evidence suggests that providing local producers with access to markets and support for technology and credit facilities through contract farming can be seen as a tool to contribute to farmers' income and productivity as well as food security (see chapters on the subject in Otsuka and Fan 2021). Even if contract farming is popular for some cash and food crop production in the developing world, it has serious limitations in terms of providing financial services such as credit and crop insurance via the formal financial system. As such, contract farming cannot be a substitute for meeting farmers' enhanced demand for financial services. Nonetheless, modern financial institutions and technology (e.g., digital financial services) can play an important role in extending inclusive market access to smallholders via contract farming.

access inputs and other technologies to modernize agriculture and improve farm/nonfarm linkages. Thus, policy interest in recent years has centered around expanding financial services for smallholder agriculture that rely on innovative financial service delivery schemes at market prices.

For example, in April 2013, the World Bank launched the Financial Inclusion Support Framework, supported by the Netherlands and the Bill & Melinda Gates Foundation, to offer multi-year support for financial inclusion to its member countries in line with their strategies and targets, including policy and regulatory reforms, financial infrastructure development, and incentives for private sector financing. Since October 2014, the framework has focused additionally on financing for agriculture-dependent households, including smallholder agriculture. Despite the rapid growth in policy interest, however, thus far the impacts of these efforts are not fully understood, including which financial products (as well as types of lending institutions) are the most effective (Delavallade et al. 2015).

Policymakers in developing countries need to better understand how agricultural finance can improve agricultural productivity and enable agriculture transformation in poorer regions. Different countries' experiences, including different demand- and supply-side constraints, would be particularly relevant in helping policymakers understand how agricultural finance functions as a policy instrument in different contexts. The traditional role of governments in finance, while waning in many countries, still looms large in supplying credit and other financial assistance to farmers, especially to farmers with larger landholdings and higher income. In recent years, many commercial banks and semi-formal financial institutions (e.g., cooperatives and MFIs) are expanding into agricultural finance. An evaluation of these efforts, as well as the constraints they face, is helpful to better understand how financial services have evolved over time to extend services to farmers and agribusinesses in order to drive financial innovation and development.

1.7 Why Agricultural Finance Is Not Sufficiently Available

Despite its potential benefits, agricultural finance in developing countries remains limited in scope for a variety of reasons. On the demand side, farmers in poorer rural areas are often unable to afford loans at the market interest rates that make loans profitable for banks; fixed repayment schedules are also not adapted to

the seasonality of farming and agribusinesses. Smaller farmers also often lack the collateral, titles to their land/property, and financial recordkeeping and cash flow planning needed to make credit assessment and monitoring easier for banks. In addition, farmers needing to make structural changes in agriculture would typically require long-term credit for investments, which is not easily available in rural areas. Farmers, especially marginal farmers and smallholders, also have varying need for financial services; as a result, the impacts of financial services on the extent and type of agricultural investment and productivity also vary.

On the supply side, agricultural markets are also often highly regulated in developing countries, with governments subsidizing input prices and other input costs and sometimes establishing artificially low prices for agricultural outputs. Direct government subsidized lending to farmers often crowds out private financial institutions. Agricultural market price fluctuations, stemming from shocks and seasonality, also complicate risk assessments by lenders, particularly if (as is often the case) these lenders lack the expertise needed to evaluate such factors and the creditworthiness of clients. Microcredit lending products, typically tailored to nonagricultural activities, also need to evolve to better serve farmers (including offering larger loans with longer horizons for repayment, as well as coordinating repayments with farmers' expected cash flows). These obstacles are all compounded by a limited network of branches and poor infrastructure in rural areas, making it difficult and costly for banks and MFIs to reach farms. Finally, smaller farmers are crowded out or inadequately targeted because they often lack the collateral, financial literacy, and connections of larger farmers and businesses.

The limited availability of agricultural finance also rests on the failed policies pursued in the past. Between the 1960s and the 1980s, developing country governments and development institutions traditionally used a top-down approach to agricultural finance, through direct lending and highly subsidized credit to farmers (e.g., Meyer 2011; Seibel 2000). Such past efforts to extend institutional finance to smallholders have failed for reasons such as interest rate suppression and government debt forgiveness (e.g., Adams 1988; Adams and von Pischke 1992). The government subsidized operation of credit schemes has failed to offer incentives to financial institutions to innovate and run self-financed financial operations at market determined prices.

The World Bank and other international donor agencies were instrumental in funding these government-aided schemes from the mid-1950s to the late 1980s (Coffey 1998), but agricultural credit was often clubbed alongside other projects, such as improved infrastructure, agricultural extension, and health services (World Bank 2003). These programs were large in scope, but lending was inefficient and often politically motivated.

In recent years, across different countries, the World Bank has created several new types of agricultural finance programs based on past experience. These include making funds directly available to institutions that in turn provide loans to farmers and rural entrepreneurs. Examples include the Second Rural Finance Project in Viet Nam, the Savings and Rural Finance SAGARPA program in Mexico, and financing microfinance organizations in Bangladesh under the Financial Services for the Poorest project. These programs, as well as other initiatives, also provide technical assistance to local financial institutions. This was a primary focus, for example, in the Strengthening India's Rural Credit Cooperatives program and in the Ghana Rural Financial Services Project, in which training and technology upgrades were provided to rural bank staff. The private-lending arm of the World Bank, the International Finance Corporation (IFC), has also been heavily involved in providing advice to several countries' financial institutions (mainly commercial banks) regarding agricultural lending and other financial services (IFC 2013).

In addition to commercial banks and agricultural development banks, MFIs have also made some headway in supplying agricultural credit and other services to rural households in Africa and elsewhere (van Empel 2010). However, these institutions have less capacity to expand because they typically do not have the required licenses to act as a financial institution for financial services such as savings mobilization from nonmembers and thus offer a limited set of financial products. For that reason, microfinance institutions tend to operate on a smaller scale and offer local, demand-driven options to better reach clients and improve profitability for lenders. MFIs' traditional focus on small nonagricultural loans with frequent repayments also needs to be adjusted for agricultural households, which are subject to seasonality of crop income. A number of bilateral and nongovernment organization–funded programs are evolving to provide these options to farmers (Kloeppinger-Todd and Sharma 2010).

Both formal banks and MFIs have developed a number of innovative ways to link institutional finance to agriculture. These include tailoring lending strategies to the agricultural supply chain in order to address limited collateral among smaller farmers. For example, farmers could borrow against output stored in licensed warehouses, or producers and processors could make binding contracts for output, after which processors would repay the producer's loan to the bank. Direct product distribution channels, such as mobile banking, are other alternatives being used (including electronic point-of-sale devices run by the Uganda Microfinance Union in rural areas), as are partnerships with agricultural marketing agencies.

Expanding coverage of financial institutions is a difficult task in many developing countries as smallholders are too poor to open an account with a financial institution and find it very expensive to do so, with bank branches often being a long distance away. In contrast, mobile technology provides an alternative to branch-based banking. This is why it is much more common for farmers in EAP to have an account with a financial institution (including MFIs) than to use mobile banking technology, given the larger network of the region's banking system and its lower reliance on mobile technology. In contrast, having an account with a mobile financial system is easier for farmers in SSA, where branch-based banking is less widely distributed but the network of mobile technology operation is large. Still, merely having a mobile account with a mobile financial system that is mainly used for extending payments and remittance transfers does not mean that farmers can use that system to secure loans for agricultural operation.

1.8 Why the Challenge Is So Difficult

Since the early 1990s, financial institutions have leaned increasingly toward creating market-based instruments for borrowers. Accordingly, there have been a number of efforts to develop market–based financial products in many countries. However, several demand- and supply-side challenges remain to making agricultural finance both profitable for institutions and relevant for producers. On the supply side, commercial banks are reluctant to develop financial products (e.g., short-term versus long-term loans) that fit the needs of farmers with varying demand. One category of financial product does not meet the demand of all categories of farmers. Banks are reluctant to innovate products based on the needs of farmers, especially smallholders, because of the lack of incentive to invest in a

long-term project. Even if there is an interest among banks to undertake innovations (e.g., in the case of crop insurance), the challenge remains as to determining a price for the financial product that can recoup the cost of the innovation.[12] For example, if the cost of innovation is added to the price, it may be difficult to market the product, as farmers may find the price too high. Governments and donors may support innovations in agricultural financial development by absorbing the cost of innovation or technology adoption, but the exact modus operandi of such support is not well developed and is very much context specific.

Often governments in developing countries find it easier to directly subsidize products through state-owned agricultural development banks rather than support innovations by commercial banks. Such an approach may be worth supporting in the short term because subsidized funds may be targeted to reach out to farmers, but in the long run, it becomes unsustainable for the government as well as for the agricultural development banks to continue supporting such subsidized operations. More importantly, subsidized operation of well-targeted financial products may be justified in the short term on strict conditions of developing products at costs affordable to farmers as well as making the operation sustainable. An approach similar to this strategy was adopted in the case of the Bank for Agriculture and Agricultural Cooperatives (BAAC) in Thailand and Bank Rakyat Indonesia (BRI) in Indonesia (e.g., Seibel 2000). The question remains: How long will such subsidized operation continue? In the case of BAAC and BRI, it took many years to reach the goal of sustainability. As agriculture is an integral part of the sustainable development goals of many developing countries, timing to support such subsidized operation of credit, insurance, or other products for smallholders may be determined by prudent government policies consistent with a country's development agenda, so that such government/donor support is not open-ended.

On the demand side, snags in farmers' demand for financial services are hindering the process of financial development. Mistrust in the system means that farmers would not even approach financial institutions for a product appropriate to their needs. On the other hand, farmers, once they have experienced waived loans because of crop failure and consequential government loan forgiveness policies, are reluctant to pay off their loans even if their crops were not affected.

[12] Continued innovation is perhaps very essential for a market that is indeed subject to uncertainty due to many factors, including consequences of agricultural risk that are sometimes catastrophic (see Hazell and Hess 2016).

They continue to expect such loan forgiveness policies in future events of such crop failures. Such expectations discourage farmers from purchasing insurance to protect against such disasters even if appropriate insurance is available.

Lack of financial literacy is another major hurdle for a good synchronization between demand and supply of financial products. There exists a mismatch of farmers' demands and banks' provision of financial products in that what is offered is not always demanded by the farmers. Government support provided via financial institutions in the event of disasters triggered by natural hazards also sometimes comes too little and too late. Such experiences of farmers have a long-term impact on farmers' willingness to assume risk in agricultural diversification or technology adoption to modernize agriculture using the financial products precisely developed and marketed for such purposes.

Mistrust in financial institutions is a major factor standing in the way of higher access to financial services in many countries. This is more so with banks than with MFIs. For example, some 20% of people who borrowed from banks are likely to borrow for agricultural/business purposes, irrespective of farmers' income. But with MFIs, where borrowers get the services at their doorsteps by being involved directly with group activities, and with MFIs' better patron–client relationships, farmers are willing to invest more in agriculture by borrowing. As smallholders are more likely to be members of cooperatives and MFIs, there is a greater share of cooperative/MFI financing in raising agricultural productivity and investment in developing countries.[13]

1.9 Organization of the Book

The book is divided into five parts. Part I provides a global perspective of agricultural finance in developing countries. This part has two chapters. Chapter 1 provides an overview of the global perspectives of agricultural finance presented above. The chapter highlights the role of agricultural finance in contributing to broad-based and inclusive development. If we believe that higher agricultural investment is critical for raising agricultural productivity, then, given the current status of agricultural finance, it is obvious that this condition of raising investment can only be met through greater access to institutional finance.

[13] See Chapter 2 of this book for details.

This overview chapter then focuses on major issues surrounding the current state of agricultural finance in developing countries, including why agricultural finance is important, who demands and who supplies different kinds of financial services, and the potential role of these services in raising agricultural investment and productivity. It follows therefore that the book discusses demand and supply constraints affecting agricultural households' improved access to and use of alternative types of institutional financial services.

Chapter 2 of Part I provides a cross-country analysis of Findex data that includes an overview of the state of agricultural finance in developing countries, including main policy actors, how different sources of financing (public/private) have evolved over the last decade, and the conceptual and practical issues in expanding credit to farmers across the distribution of landholdings and income. The chapter presents a summary of the cross-country analysis of 148 countries using the 2017 Global Findex data, covering the borrowing patterns and credit constraints of households involved in agriculture. Issues examined include whether reported constraints among agricultural households stem from access issues, perceived inability to engage in formal finance, and/or other reasons.

The findings in the chapter show that ownership of a transaction account with a financial institution is highest in EAP (56%), followed by South Asia (44%) and SSA (25%). Mobile technology has constituted a major factor in agricultural finance in recent years, especially in SSA. In 2014, the rate of ownership of mobile money accounts was 25% in SSA and 10% in EAP, although only 5% in South Asia. Better access to institutional finance does not always mean better access to credit from institutional sources. In EAP, for example, despite the region's better coverage of financial institutions, only 20% of those having a financial transaction account borrowed from institutional sources and only 38% borrowed from informal sources. In SSA, which has the lowest coverage of financial institutions, the respective shares are only 8% from institutional sources and an overwhelming 54% from informal sources.

The cross-country analysis shows that financial account ownership is strongly associated with agricultural productivity. The demand for financial services is high across farmers of varying wealth from poor to rich landowning groups, with the highest demand among rich and educated households. MFI activity, however, is strongly pronounced among the poorer farm households. Mobile banking is found effective in connecting farmers in difficult-to-reach areas, especially in SSA.

Part II is an in-depth analysis of agricultural finance issues of two leading East Asian countries. In particular, Chapter 3 provides a case study of Thailand. Thai agriculture accounts for about 8% of the country's GDP while accounting for one-third of the labor force. A major actor in rural finance is the Thailand Village and Urban Community Fund (TVF or "Village Fund") program, the second-largest microcredit scheme in the world. Nearly 80,000 elected local Village Fund committees administer loans that reach 30% of all Thai households (40% of rural and 10% of urban households). The value and distribution of TVF loans has remained steady since 2006, even without new infusions of government funds, and loans go disproportionately to poor people.

The other major actor in Thailand's agricultural finance is the BAAC (Bank for Agriculture and Agricultural Cooperatives). Using both household and institutional data, the chapter covers a spectrum of issues related to agricultural finance. Because the country engaged in agricultural finance earlier than many others, Thailand provides a unique case study of policymaking concerning financing agriculture. The country's cross-sectional, multi-year surveys, collected through socioeconomic surveys, also provide rich data sets with which to analyze issues such as access, constraints, and impacts at the household level. Moreover, the institutional data for BAAC and Village Funds provide information regarding institutional efficiency in supporting the government's financial inclusion policies.

Thailand has a dynamic agricultural sector based on smallholder family farms. One of the catalysts for this rural transformation has been the expansion of credit, especially from formal sources such as BAAC and semi-formal sources such as Village Funds. Banking facilities are widely available in Thailand. As per the Global Findex data of 2021, some 99% of farmers had a financial account and some 55% had taken loans. However, only 19% borrowed from financial institutions. BAAC is the major lender of farm loans. The incentives built into BAAC's interest rate structure, as well as its flexibility in administering loans, its extensive network of branches, and the variety of savings instruments it offers, have made it possible for BAAC to expand its portfolio rapidly over time. While BAAC was heavily subsidized until the late 1990s, it is no longer a subsidized entity and uses mobilized deposits as its principal source of capital. The case of the TVF is different. The TVF helped bring credit to an underserved group of lower-income agricultural households and have had some impact on raising consumption and income. But they do not mobilize savings like BAAC,

and they hence depend on the government for funding.[14] Financial institutions do need to address crop insurance—farmers are not insuring crops, partly because the insurance market is not as developed as the rural credit market.

Chapter 4 presents a study on Viet Nam, a country where 70% of the population lives in rural areas. Although the country has experienced rapid economic growth since 2000, rural households still face many barriers to credit. Thus, there has been a strong policy interest recently in expanding financial services to rural households. The World Bank, for example, has established a series of large-scale rural finance projects in Viet Nam since 1996 to increase access to credit for medium- to long-term financing for capital investments among rural households (including agricultural activities such as agro-processing, cultivation, and livestock), as well as to improve access to finance for rural poor people. This country study measures the impact of credit, including microcredit, on household incomes and consumption in Viet Nam and then traces the impact on poverty. The study uses a panel of rural households surveyed in 2004, 2006, and 2008 to examine the impact of credit from a number of sources, including the Vietnam Bank for Social Policies (VBSP) and the Vietnam Bank for Agriculture and Rural Development (Agribank). The study seeks to measure the direct effects of credit on income and expenditure; in addition, a robustness check looks at the effects on profit from self-employment and on farm efficiency.

The Viet Nam study shows that larger farmers are well served by Agribank, the large state-owned agricultural lender. This lender appears to be profitable but is slowly reducing its lending to agriculture. In contrast, VBSP is found to be an effective lender to poorer households, channeling half of its loans through the Women's Union, which forms groups of borrowers. However, VBSP is heavily subsidized by the state, to the tune of about 2% of the value of its loans, and makes only modest efforts to mobilize deposits. Hence, VBSP is sustainable only as long as the government supports its operation. VBSP lending has a positive impact on consumption but no significant impact on income, perhaps because only half of the loans are used for productive purposes. Thus, Viet Nam still faces challenges in terms of developing a sustainable organization that supports agriculture (especially smallholders) as well as poor people, minorities, and women.

[14] Note that the BAAC was dependent initially on government funds until it became sustainable over time.

Part III presents a South Asian perspective of agricultural finance drawing examples of two leading countries in the South Asia region. More specifically, Chapter 5 presents a study of agricultural finance issues in Bangladesh. As per the latest data, agriculture accounts for 12% of Bangladesh's GDP and 38% of overall employment. The Global Findex data of 2021 for Bangladesh suggest that 69.7% of farmers had a financial account in Bangladesh compared to 57.3% in South Asia and 57.1% in the developing world. The government has been steadily increasing the share of public funds for agricultural lending to help ensure food security in the country, raising the agricultural credit disbursement target by 22.7% to Tk115 billion between 2008–2009 and 2009–2010 (Bangladesh Bank 2010). The chapter uses recently augmented household panel data spanning 20 years (1991, 1998, 2011) to examine the effects of rural credit expansion (both microcredit and formal bank channels) on outcomes for agricultural households. The study finds that microcredit has benefited households with lower landholdings by raising agricultural income from activities such as livestock rearing that require less land. In addition, microcredit has increased nonfarm income diversification for all households, although the strongest effects have been seen for landless or near-landless households. Microcredit is *not* found to have strong effects on crop income in Bangladesh; however, reported supply-side credit constraints significantly lower crop income. Borrowing by both men and women has contributed to nonfarm income growth for marginal farmers, but only men's borrowing has contributed to nonfarm income growth among higher landowning groups.

Drawing aggregate institutional data from both agricultural development banks and MFIs active in rural areas, the chapter finds that agricultural banks and MFIs provide a variety of financial services for both farmers and nonfarmers, such as mobilizing savings and providing insurance and remittances to agricultural households. However, agricultural development banks remain too dependent on government funds and are not self-sustainable. In contrast, MFIs are more cost-efficient than the state-run agricultural development banks. The government's direct role in agricultural finance in Bangladesh needs to be evaluated based on the experience of MFIs active in rural and agricultural finance.

Chapter 6 discusses the agricultural finance issues of India. India provides an interesting context, as the country has seen rapid and structured expansions in agricultural credit over the last several decades (Golait 2007; Binswanger and Khandker 1995). While some of these programs have had positive effects,

there have also been downsides stemming from inefficiencies in program design and execution. The chapter is based on administrative data and household panel data from the 2005 and 2011 rounds of the nationally representative Human Development Survey conducted by the University of Maryland and India's National Council of Applied Economic Research. The survey includes detailed modules on agriculture and access to credit that have allowed us to analyze trends in borrowing, savings, and remittances received by rural agricultural households over time. Institutional data from major banks, such as India's National Bank for Agriculture and Rural Development, and nationwide MFIs are presented to discuss outreach to agricultural households (i.e., financial inclusion) and their financial efficiency in serving the financial needs of rural clients.

Despite the rapid growth of institutional credit to agriculture seen in India since the mid-2000s, there has also been an increasing share of small and marginal farmers in the national composition of operational holdings. The study finds that small and marginal farmers remain dependent on informal credit despite an increase in their access to institutional finance. Part of the problem lies in supply-side issues. The growth in bank-provided agricultural credit has typically been focused on larger loans, which tend to reach large landholding groups. On the other hand, the government's reliance on agricultural debt waiver policies have induced banks to shift away from areas with greater risk. Household survey data show that targeting of small and marginal farmers has been mixed; farmers who borrow for agriculture tend to be wealthier, have larger landholdings, and be located in areas with better infrastructure such as electricity and roads. The challenge thus is how to enhance access to institutional finance, not only credit but also other financial services, for smallholders in order to increase agricultural investment and productivity in smallholder agriculture.

Part IV provides regional perspectives of agricultural finance beyond Asia. In particular, Chapter 7 presents a regional perspective of agricultural finance of a predominantly subsistence economy, that of sub-Saharan Africa. SSA is home to some 1.2 billion people who are mostly smallholders, managing 80% of the farmland. Because the agrarian economy is largely subsistence, large investments are necessary to commercialize subsistence agriculture and enhance overall productivity and growth in support of sustainable growth and development. The discussion on SSA is thus important for two reasons: (i) it is one of the predominantly agricultural economies with the highest share of smallholders in agriculture and (ii) the region has a very poor branch network of non-digital

financial institutions, but it has a huge mobile financial network due to the unprecedented growth of mobile phone technology. As per the Global Findex data of 2021, the financial inclusion rate among farmers was 55.2% in SSA compared to 57.1% in the developing world. The financial inclusion in SSA was largely enabled by farmers' access to digital financial services—while 32.8% of farmers had an account with a financial institution (either banks or MFIs), 42% had a MFS account.

The only way to promote private investment in agriculture in SSA and make it commercialized from its subsistence level is to support both short- and long-term financing of farming, agro-processing, and related supply chains of agriculture. The role of credit, for example, in supporting agriculture has been of major policy interest in many SSA countries. However, because of poor business operations of the existing financial institutions, financing agriculture to support commercialization and promote private investment in agriculture via financial institutions has been a big challenge for countries in SSA. No wonder farmers have very limited access to institutional credit; although 67% of farmers borrowed in 2021, only 10.9% borrowed from financial institutions. Hence, the bulk of borrowing was informal, which may not be helpful in raising investment in agriculture.

The chapter considers two country case studies of agricultural finance: one from Ethiopia and the other from Uganda. They represent two opposite cases of agricultural finance issues in the region. Ethiopia represents the case of a branch-based financial network while Uganda represents the higher penetration of mobile financial services. For example, in 2017, some 58% of farmers had a mobile account in Uganda compared to only 0.2% in Ethiopia. But in both countries, farmers are found to rely on institutional finance for borrowing. For instance, in 2017, 13.7% of farmers in Ethiopia and 16.4% of farmers in Uganda borrowed from financial institutions.

Household survey data and institutional data from both countries suggest that agricultural credit has an important role in raising farm productivity, but their institutions (both banks and MFIs providing retail banking) are not well equipped to serve the rural communities. Cooperatives, not MFS, are found to enhance agricultural productivity at a higher rate in Uganda, highlighting the fact that retail banking must be digital in order to serve the needs of subsistence farmers in SSA.

As SSA has a high penetration of mobile phones (93% of people own mobile phones), the region experienced high growth in mobile money accounts—42% of farmers in SSA have mobile money accounts, compared to 15% in South Asia and 12.9% in EAP. While the MFS have been very active in extending payments and remittance services, they have not been so active with credit and other financial services. Hence, digitizing financial services of banks, MFIs, and cooperatives with the help of mobile technology is perhaps a way to move forward with the extension of agricultural finance to meet the unmet demand for financial services in this region.

Chapter 8 presents a regional perspective of agricultural finance from LAC, a more developed region in comparison to SSA. LAC is home to a population of 650 million with agriculture accounting for only 8% of GDP and 14% of employment. Nonetheless, LAC is a net exporter of food and has been a net exporter over the last two decades. Part of the credit for this goes to commercialized farms, which control more than half of the land in LAC. Interestingly, there is a dualism in agriculture: a large majority of farmers cultivate tiny areas of land as their family business, which is not even sufficient for them to sustain their daily life. For example, in Paraguay, there are about 5.2 million farms of which 1 million occupy 75% of the agricultural land. More importantly, many small and marginal farmers lack security of land; e.g., only half of the land parcels in Brazil are registered. Consequently, while large farmers have access to institutional finance, many smallholders lack such access. As per the recent Global Findex data, about two-thirds of farmers in LAC have an account with a financial institution but only one-fourth have actually borrowed from a financial institution. For example, only 10.4% of Mexico's agricultural households borrow for agricultural purposes, demonstrating that agriculture is mostly self-financed or informally financed. While agriculture makes up a smaller share of total institutional credit than the share of GDP would warrant, most of the LAC countries are not out of line with that of other developing regions.

Many governments in LAC continue to subsidize agriculture to promote exportable food items such as high-value fruits, maize, and poultry. In most cases, governments subsidize agriculture in part through low-interest loans and loan guarantees. In some countries, interest rates are kept low through public subsidies, which reduces price rationing, but the resulting low profitability for lenders may decrease the supply of lending, which increases quantity rationing.

For governments that support lending to farm households—such as Brazil and Mexico—there seems to be room for targeting the subsidies better to poorer farmers.

There is a growing recognition of the importance of risk rationing, where borrowing may be profitable on average, but the risks in the case of a shock are too great. Very few farmers carry any form of production insurance—just 3.6% in Mexico, for instance. A promising direction is to expand the availability of index-linked insurance for the institutions that serve farmers, including suppliers, lenders, cooperatives, and local governments. The other promising direction in extending agricultural finance to smallholders in agriculture is through mobile banking. It could be a more promising path in a country such as Paraguay that does not have much of a branch-based banking network but has high coverage of mobile phone technology. Mobile banking could be a useful tool for borrowing, payments, or savings for smallholders in agriculture.

Finally, Part V presents a discussion of emerging opportunities related to agricultural finance and the ways to further development in this important area. More specifically, Chapter 9 presents a discussion on digital finance to support agricultural finance meant to reach smallholders in agriculture, who have limited access to institutional finance but who cultivate more than three-fourths of land worldwide. Digital finance is now a ubiquitous feature of modern finance, but digital financial services (DFS) are available widely in the developing world and to the smallholders in the form of mobile financial services (MFS) thanks to the penetration of mobile phone technology in remote rural areas. Unfortunately, MFS are used primarily for cashless transactions of payments and remittance transfers but hardly for extending credit and mobilizing savings, the most important components of financial services that are necessary for augmenting private investment and productivity in agriculture.

Drawing examples of traditional versus digital financial services for agriculture in two regions—Asia and Africa—the chapter attempts to explain why digitalizing of three branches of financial services (traditional banking, MFIs/cooperatives, and MFS) is necessary to benefit smallholders in agriculture and transform subsistence agriculture into commercial farming that enhances the production, processing, and distribution of high-value crops, fruits, and vegetables. Commercial agriculture is necessary for attaining global food security, given the uncertainty due to global warming and the ongoing conflicts among nations.

As agriculture is run by smallholders in Asia, Africa, and LAC, credit access in particular is necessary. Credit can come from commercial banks, which are capable (unlike cooperatives and MFIs) of mobilizing savings at a large scale.

Commercial banks, however, are found to be reluctant to lend to smallholders due to the high transaction cost of lending and mobilizing in small amounts. Meanwhile, MFIs and cooperatives, which are found to reach small farmers and businesses, are not able to mobilize savings to extend credit services the way commercial banks can. And MFS, which can reach smallholders and small businesses through mobile technology, are not in a position to provide loans or mobilize savings, in part because they are not allowed by the regulators and in part because they are not equipped yet to extend such financial services. Of course, there are some technologies being developed and used in different countries for agricultural lending, and it is highly recommended that donors and governments support such initiatives as observed. Digital financial services are better equipped to serve agriculture because they reduce both the screening costs of lending and the inconvenience cost of borrowing in a way that non-digital financial institutions are not capable of.

Chapter 10 discusses the lessons learned from both the multi-country studies and the cross-country analysis. The overwhelming lesson learned is that while there has been progress in inclusive finance for agriculture in developing countries, institutional finance is mostly meeting the needs of large farmers and leaving small and marginal farmers on their own. Even if they are financially included in terms of having an account with a financial system, including MFS, smallholders in agriculture have limited access to institutional finance, such as credit, for a variety of reasons including lack of physical access to financial institutions; they still depend more on self- and informal finance rather than on institutional finance. While MFS have potential for extending credit, savings, and insurance at affordable costs for both providers and consumers, they have remained a major source for payments and remittance transfers but not for providing other categories of financial services more important for smallholders in charge of enhancing both productivity and food security. In sum, the book's overwhelming lesson is that digitalization of agricultural finance is the only way to transform agriculture from its subsistence level and provide the affordable financial services that will be indispensable for attaining agricultural growth and global food security.

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CHAPTER 2

Measuring Financial Inclusion for Agriculture Using Global Findex Data

Gayatri B. Koolwal and Shahidur R. Khandker

2.1 Introduction

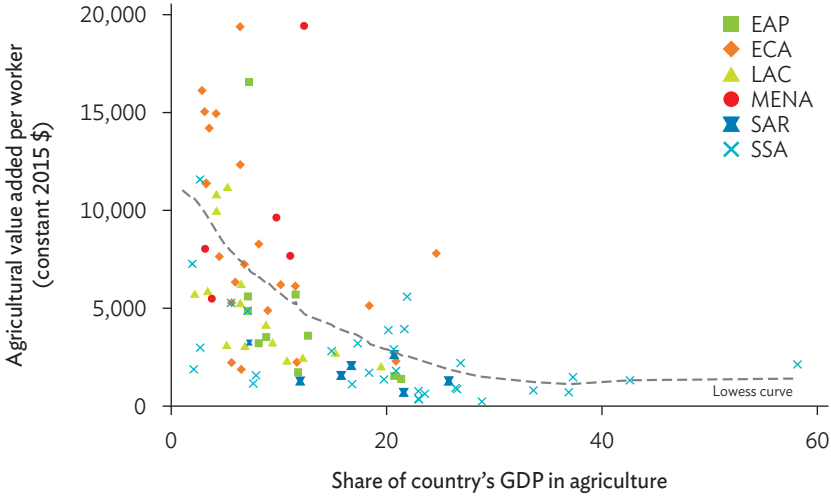
In recent years, volatile agricultural prices, along with changes in climate and weather patterns, have raised fears about food security in developing countries and have placed increasingly complicated financial constraints on small- and medium-scale agricultural producers who rely on the sale of their output for income (FAO 2016).[1] Unpredictable harvests, a lack of available inputs, and reduced income flows have posed a growing challenge for many farmers, particularly smaller producers who already faced greater vulnerability in these areas and who generally have less collateral and lower production efficiency. In response, policymakers have increasingly focused on approaches to raise agricultural productivity in order to ensure sustainable economic growth—including investing in new technologies, seeds/crops, and processes to help farmers manage weather shocks, as well as investing in services and infrastructure to help agricultural households better access markets. However, financing these investments remains a challenge, particularly in low-income contexts with greater exposure to risk and with limited or no access to credit, insurance, and other financial services.

Low-income countries tend to have the greatest dependence on agriculture, as well as the lowest agricultural productivity. Using statistics from the World Development Indicators, Figure 2.1 presents trends in country-level correlates of agricultural productivity (agricultural value added per worker and average cereal yield per hectare are presented as examples) against a share of agriculture in gross domestic product (GDP). Across all regions, measures of agricultural productivity tend to decline with the share of agriculture in GDP.

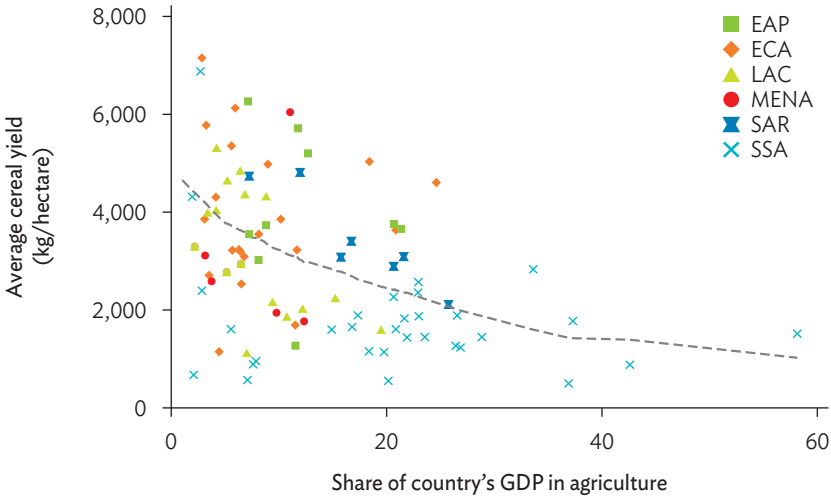
[1] This study focuses on farmers who sell some or all of their output in the market and who comprise the middle of the landholding distribution. Subsistence farmers, who consume most of what they produce, are not included, nor are large farming estates, which tend not to face financing constraints.

Figure 2.1: Country-Level Correlates of Agricultural Productivity Against Share of Agriculture in Gross Domestic Product, 2019

A. Agricultural Value Added per Worker



B. Average Cereal Yield



EAP = East Asia and the Pacific, ECA = Europe and Central Asia, GDP = gross domestic product, kg = kilogram, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SAR = South Asia, SSA = sub-Saharan Africa.

Notes: Regional labels/colors are used for different countries. Locally weighted regressions (bandwidth = 0.8) presented along with scatterplots.

Source: World Development Indicators (2019).

As Figure 2.1 shows, much of this trend is driven by low productivity in agriculture-dependent economies in sub-Saharan Africa (SSA), where nearly all farmers are smallholders.[2] Economies with greater diversification across sectors, including countries in Europe and Central Asia (ECA) and Latin America and the Caribbean (LAC), tend to have higher agricultural productivity, likely owing to better agricultural technology and larger commercial farms.

Raising smallholders' productivity is key to economic growth and sustainable livelihood improvements across much of the developing world—according to recent Food and Agriculture Organization statistics, smallholders manage 80% of the farmland in sub-Saharan Africa and Asia.[3] In addition, in many countries, nonfarm activities of rural households are often connected with agriculture as well, underscoring the importance of raising agricultural productivity and demand across sectors (see McCullough [2017] for a discussion of SSA and ILO [2014] for a global analysis).

2.2 Potential Role of Financial Services in Raising Agricultural Productivity

Financial services, including agricultural financing and assistance for farmers to engage in other financial transactions, are an important—although still nascent—approach to boosting agricultural productivity. For example, with better access to finance, farmers can purchase inputs such as seeds, fertilizer, and improved fodder for livestock. Farmers can also purchase or lease production machinery, such as tractors, or invest in improved planting and irrigation technologies. The benefits of financial services for agriculture are not limited to better access to credit, however. Having a financial or mobile money account that allows for payments can reduce farmers' reliance on cash transactions and reduce time burdens in conducting transactions. In Kenya, for example, mobile money accounts are increasingly being developed to link farmers, agents, and buyers (Kikulwe, Fischer, and Qaim 2014). In general, mobile-based financial services have emerged as instruments to overcome geographic and infrastructure constraints and to draw a greater share of the population into formal financial services, particularly in sub-Saharan Africa.

2 While the interpretation of "smallholder" can vary across countries, FAO defines a smallholder as working on up to 10 hectares.

3 See FAO (2012).

Weather-based insurance, such as rainfall index insurance, is also being explored as a way to help farmers better cope with drought; however, take-up of these products remains low, particularly among smaller farmers and farmers who are less informed or trained about risk sharing (see Giné, Townsend, and Vickery 2008 for a study from India and Dercon et al. 2014 for a study from Ethiopia).

Despite their potential benefits, financial services for agriculture still face several limitations in developing countries:

- On the supply side, agricultural financial markets have historically been highly regulated in developing countries, with governments intervening by subsidizing input prices and other input costs and occasionally by establishing artificially low prices for agricultural outputs. Direct government-subsidized lending to farmers also tends to crowd out private financial institutions. Other agricultural market price fluctuations due to shocks and seasonality also complicate risk assessment by private lenders, particularly if (as is often the case) these lenders lack the experience or expertise in agriculture needed to evaluate risk factors and the creditworthiness of potential clients. These obstacles are all compounded by poor infrastructure and a limited network of financial institution branches in rural areas, making it difficult and costly for banks to reach farms to provide both credit and other financial services (such as accounts). Even in countries whose financial markets have been liberalized, smaller farmers are typically "crowded out" or inadequately targeted because they often lack collateral, financial literacy, and connections of larger farmers and agribusinesses (see, for example, Jessop et al. 2012).
- On the demand side, farmers in poorer rural areas are often unable to afford loans at the market interest rates that make loans profitable for banks; fixed repayment schedules are also not adapted to the seasonality of agricultural production. Farmers also often lack the collateral, secure ownership of land/property, and financial recordkeeping and cash flow planning needed to make credit assessment and monitoring easier for banks. Farmers who need to make structural changes on their farm would typically require long-term credit for investments, which is not easily available in rural areas. Smaller farmers may also lack the financial literacy needed to engage effectively with formal financial institutions, thereby limiting their take-up of banking and other services that ease noncash transactions. For agricultural financing in particular, microfinance institutions (MFIs) may be a better resource than formal financing channels for poorer farmers.

Given the limited scope of financial services for agriculture in developing countries, how can one assess the potential benefits of these services to agricultural households? In addition to parsing out which aspects of **financial inclusion**—such as account ownership (i.e., an account with a bank or financial institution) and the ability to conduct cashless transactions, savings, borrowing, or a combination of these factors—are more strongly correlated with agricultural productivity, it is also necessary to understand the constraints to formal finance encountered by agricultural households. Broadly, financial inclusion means that individuals and businesses are able to affordably access the financial products and services that they need, including transactions, payments, savings, credit, and insurance.[4] Such financial access can smooth consumption and help families and businesses plan for everything from long-term goals to unexpected emergencies.

In particular, the literature lacks analysis of cross-country evidence regarding financial inclusion. In this chapter, we use the Global Financial Inclusion (Global Findex) Survey, a large, individual-level, cross-country dataset with detailed measures of financial inclusion, to better compare how take-up of financial services varies across countries. We use multiple rounds of the Findex (2011, 2014, 2017, and 2021) to examine how individuals working in market-based agriculture[5] use different services (financial account ownership as well as participation in other formal and semi-formal financial services, including borrowing, savings, and remittances) and how that participation is correlated with country-level estimates of agricultural productivity. The Findex data, and more specifically the 2017 round, also allow us to examine the constraints to financial account ownership among individuals involved in market-based agriculture—including whether reported constraints stem from access issues, perceived inability to engage in formal finance, and/or other reasons. We also examine trends across the income distribution and across different levels of education.

As seen in this book, country-specific household surveys (the Living Standards Measurement Study–Integrated Surveys on Agriculture, for example) with detailed modules on agriculture allow for a much more refined, household-level examination of the links between agricultural productivity, socioeconomic

4 See World Bank (n.d.).

5 Specifically, the Findex asked individuals whether they received payments for the sale of agricultural products. As a result, our focus on agriculture in this chapter is restricted to market-based agriculture rather than on agriculture purely for own consumption.

characteristics, and financial services. Cross-country analyses will not be able to identify the exact channels driving financial inclusion and investments in agriculture. However, using aggregation/large sample sizes when examining comparable data across countries can help researchers and policymakers better understand which potential channels are more likely to be beneficial—for example, which types of financial services are more strongly associated with agricultural productivity across countries and across the distribution of individual income. Household surveys with modules on finance also tend to focus on savings and borrowing and do not include information on different types of account ownership that can ease transactions (including mobile banking) and cash/noncash remittances. The Findex's detailed questions regarding different forms of financial services allow for a more comprehensive and comparable set of measures of financial inclusion across countries. Although the Findex does not include a broad set of socioeconomic variables beyond education and income, we can examine some interesting trends regarding the relative importance of education versus income for different indicators of financial access and participation, as well as whether any constraints exist for individuals owning a financial account.

Our analysis is the first of its kind to use the Findex to examine financial inclusion among individuals working in market-based agriculture across countries and to present a cross-country analysis of likely channels through which financial services can aid investments in agriculture. Through the descriptive analysis in this chapter, we also aim to help inform policymakers of constraints to accessing and using financial services in agriculture, thus identifying where better targeting is likely needed.

2.3 Main Questions and Findings

(i) **What is the correlation between financial inclusion and agricultural productivity, and which aspects of financial inclusion matter more?**

- Financial account ownership, particularly the ability to conduct cashless transactions (mostly through debit cards), has the strongest positive correlation with measures of agricultural productivity at the country level. This positive association with agricultural productivity holds across individuals in agriculture across all wealth quintiles.
- In countries with higher agricultural productivity (across different measures, including value added per worker, cereal yield, and other

measures), financial account ownership has increased more rapidly than in countries with lower agricultural productivity. This underscores the circular relationship between productivity, income, and access to financial institutions that needs to be understood further with detailed household panel survey data.

- We also find demand for financial services among individuals in market-based agriculture; while poorer and less educated overall, these individuals often report a high degree of savings and borrowing relative to those not in engaged in agricultural work. These individuals are also much more likely to save and borrow for potentially productivity-enhancing investments in their farm/business. Thus, there is clearly a need to better target these groups.

(ii) **What are constraints to financial inclusion?**

- Individuals in market-based agriculture tend to report as overarching constraints to account ownership a lack of money and a lack of geographical access (with financial institutions located too far away). In particular, in regression analyses controlling for socioeconomic and geographic variables, the role of distance emerges as a key constraint among those in market-based agriculture, particularly for those at the higher end of the income distribution.
- In the regression analysis, we find that while both education and income are positively correlated with financial activity, these correlations are greater for market-based agriculturalists than for the rest of the sample. This difference underscores the poorer access to financial institutions that exists more broadly within the agricultural sector.

2.4 Data

The Global Findex is the most comprehensive cross-country survey on financial inclusion, surveying men and women in more than 140 countries on their access to and use of financial services.[6] In addition to questions regarding accounts with financial institutions (including commercial banks, microfinance institutions, and

[6] The Global Findex sample sizes are 1,000 per country; while this is not large, the surveys are nationally representative. The Findex was designed by the Development Research Group at the World Bank and administered by Gallup through its Annual World Poll Survey. Women and men aged 15 years and older were surveyed.

post office accounts), the survey asks about deposits and withdrawals into/from savings accounts, use of savings accounts, sources and purposes of borrowing, and mobile banking activity. The survey also asks non–account holders why they do not maintain an account (too far away, too expensive, lack of confidence in themselves/the institution, and other personal reasons, with multiple responses permitted).[7] Additional individual-level characteristics include age, education level, and income quintile.

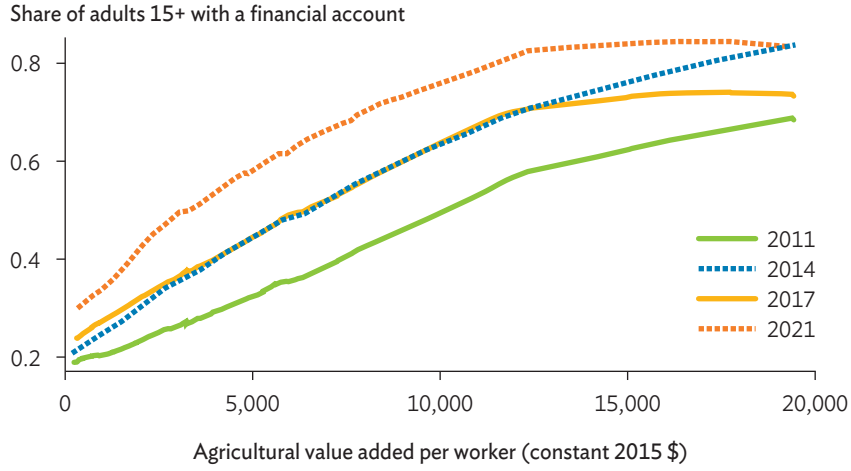
Understanding the links between agricultural productivity and financial inclusion is complex and requires household panel survey data to clarify how access to financial services can drive productivity. Although the Global Findex does not include a broad set of socioeconomic variables beyond education and income, we can examine some interesting descriptive trends regarding correlates of financial access and participation among individuals in market-based agriculture across countries, as well as what types of financial services seem to be more strongly associated with productivity.

For example, Figure 2.2 presents locally weighted regressions across the Findex countries, showing the trend in financial account ownership against agricultural value added per worker as a measure of agricultural productivity for all four rounds.[8] Looking at Figure 2.2, we see that financial account ownership generally increased over the period, for different years, among countries with higher levels of agricultural productivity, and that the pace of this increase was faster over time (moving from 2011 to 2021, for example, with an exception for very high levels of agricultural productivity for 2017). Thus, in addition to the potential of financial services to raise agricultural productivity in the long run, higher productivity (which is also associated with better infrastructure and technology) can also accelerate participation in formal financial activity.

7 The Findex only covered constraints on having a financial account, not constraints on borrowing.

8 This indicator is obtained from the World Development Indicators; agriculture value added per worker is a measure of agricultural productivity. Value added in agriculture measures the output of the agricultural sector (ISIC divisions 1–5) less the value of intermediate inputs. Data are in constant 2010 United States dollars. Results were similar when looking at the change in financial account ownership against other correlates of agricultural productivity in the World Development Indicators, including average cereal yield (kilogram per hectare) and arable land (hectares per person).

Figure 2.2: Country-Level Locally Weighted Regressions: Financial Account Ownership Against Agricultural Productivity, 2011–2021



Note: Locally weighted regressions (bandwidth = 0.8).

Source: World Bank Global Findex data. Indicators on agriculture for these years obtained from the World Development Indicators.

Precisely untangling these relationships is ultimately a causal question addressed in the other country chapters in this book using household panel survey data with enough detail on household agricultural investments and access to and use of specific financial instruments. In this chapter, we focus on a descriptive analysis using the Global Findex's rich data on financial services and dimensions of access; these data are comparable across countries and allow us to uncover likely channels affecting financial inclusion and investments in agriculture (focusing specifically on the 2014 round, which allows us to isolate individuals working in market-based agriculture).

Among variables on income and employment, the Findex classifies individuals by income quintiles but does not explicitly ask about sectors of work, including agriculture. The 2011, 2014, and 2017 rounds include specific questions targeted toward individuals involved in agriculture—those engaged in any activity across crop/livestock farming, forestry, and/or fishing. In the 2011 round, the survey also includes a question regarding whether individuals paid for crop, rainfall, or livestock insurance in the past year (Demirguc-Kunt and Klapper 2012).

For those not engaged in agriculture, the agricultural insurance variable was coded as missing (nonresponses by agriculture-dependent individuals were coded as a fourth category).[9] In the 2014 and 2017 rounds, the insurance question was no longer included, but the survey did include a question regarding whether individuals received payments for any agricultural products. This latter question fits better with the focus of our analysis here, namely on agriculturalists who are seeking to boost their incomes from agriculture through finance and resulting investments. The 2014 and 2017 rounds do not allow us to obtain estimates of agriculturalists working solely in own-use production; rather, we focus only those already involved in any production for sale (this could also include subsistence farmers who sell a small share of their agricultural products).

When examining individual socioeconomic correlates of financial inclusion in market-based agriculture, we therefore focus on the more recently available 2017 round in order to avoid biases in comparisons across rounds. We do use both the 2014 and 2017 rounds in our country-level comparisons of changes in financial inclusion relative to aggregate country-level measures of dependence on agriculture (share of GDP in agriculture, for example). For the rest of the chapter, when we refer to individuals in agriculture, we mean those specifically engaged in market-based agriculture (farmers receiving agricultural payments for crops or livestock).

Table 2.1 provides a breakdown of individual characteristics of gender, education, and income quintile available from the Findex. Since substantial variation exists across countries, we present summary statistics across regions as well. High-income countries were excluded from the table since we focus on developing countries in this chapter. Table 2.1 shows that individuals in market-based agriculture in 2017 were often significantly more likely to be men (with more parity in East Asia and the Pacific [EAP], ECA and SSA), as well as more likely to have lower education and income levels. Regarding income, agriculturalists were also more likely to fall into the bottom income quintile.

[9] In sum, the responses for the agricultural insurance question could be coded as yes, no, no response, or missing (the latter for those not economically dependent on agriculture). Given the limited extent of agricultural insurance programs, only 6% of households in agricultural activities reported purchasing insurance (this could be a function of limited supply as well as demand).

Table 2.1: Descriptive Statistics for Individuals in Market-Based Agriculture, 2017 Round

	East Asia and the Pacific (EAP)	Europe and Central Asia (ECA)	Latin America and the Caribbean (LAC)	Middle East and North Africa (MENA)	South Asia (SAR)	Sub-Saharan Africa (SSA)
Female	0.45	0.44	0.34	0.24	0.42	0.45
	[0.50]	[0.50]	[0.47]	[0.43]	[0.49]	[0.50]
Education						
Primary or lower	0.68	0.23	0.46	0.72	0.69	0.74
	[0.47]	[0.42]	[0.50]	[0.45]	[0.46]	[0.44]
Secondary	0.27	0.66	0.45	0.23	0.29	0.24
	[0.44]	[0.48]	[0.50]	[0.42]	[0.45]	[0.42]
Tertiary or higher	0.04	0.11	0.09	0.04	0.02	0.01
	[0.20]	[0.32]	[0.29]	[0.20]	[0.15]	[0.12]
Income quintile						
Poorest 20%	0.26	0.22	0.21	0.26	0.21	0.18
	[0.44]	[0.41]	[0.41]	[0.44]	[0.41]	[0.39]
Top 20%	0.14	0.16	0.20	0.15	0.18	0.18
	[0.34]	[0.37]	[0.40]	[0.36]	[0.39]	[0.38]
Number of respondents in market-based agriculture	**3,130**	**2,796**	**1,015**	**515**	**1,548**	**8,687**
Share relative to total sample	**0.23**	**0.13**	**0.06**	**0.04**	**0.18**	**0.26**

Notes:

1. Statistics reflect shares of individuals reporting; standard deviations in brackets. Sampling weights used.
2. High-income countries are excluded from the table.

In EAP, for example, 26% of individuals in market-based agriculture were in the lowest 20% of the income distribution, compared to 14% in the top 20%; this pattern was similar in ECA, the Middle East and North Africa (MENA), and South Asia (SAR).

In the full sample for 2017, we also find that individuals involved in market-based agriculture reported feeling less likely to be able to come up with funds needed in an emergency and being less likely to access institutional financing in the event of an emergency. Within the full sample across countries, for example, only 25% of those in market-based agriculture said it was "very possible" for them to come up with emergency funds, compared to 31% of individuals not engaged in agriculture.[10] Table 2.2 presents the different sources of funding that individuals in market-based agriculture who said they could come up with funds to respond to emergencies might seek. The table examines responses by individual's financial account ownership and income quintile, as well as by region.

Table 2.2: Source of Emergency Funds for Individuals in Market-Based Agriculture, by Whether They Own a Financial Account, 2017 Round

	East Asia and the Pacific		Europe and Central Asia		Latin America and the Caribbean	
	No fin acct	Fin acct	No fin acct	Fin acct	No fin acct	Fin acct
Highest income quintile						
Savings	0.10***	0.25***	0.20**	0.31**	0.11***	0.28***
Relatives/friends	0.18	0.16	0.44**	0.30**	0.20***	0.07***
Money from working	0.59	0.51	0.26	0.28	0.48	0.50
Borrowing: bank, employer	0.02	0.03	0.01***	0.08***	0.05	0.06
Selling assets	0.09**	0.03**	0.05***	0.01***	0.10	0.06
Number of individuals	**165**	**240**	**152**	**285**	**63**	**123**
Lowest income quintile						
Savings	0.12	0.15	0.09***	0.26***	0.12	0.12
Relatives/friends	0.24	0.22	0.55	0.44	0.15	0.26
Money from working	0.48	0.36	0.15	0.20	0.45	0.48
Borrowing: bank, employer	0.04	0.09	0.06	0.03	0.09	0.00
Selling assets	0.09	0.13	0.13*	0.05*	0.13	0.14
Number of individuals	**182**	**113**	**166**	**121**	**50**	**22**

continued on next page

[10] Full sample results available on request.

Table 2.2: ***Continued***

	Middle East and North Africa		South Asia		Sub-Saharan Africa	
	No fin acct	Fin acct	No fin acct	Fin acct	No fin acct	Fin acct
Highest income quintile						
Savings	0.25	0.44	0.24**	0.34**	0.17***	0.29***
Relatives/friends	0.48***	0.09***	0.50***	0.30***	0.21***	0.15***
Money from working	0.26**	0.41**	0.16	0.25	0.38	0.37
Borrowing: bank, employer	0.00	0.01	0.01	0.03	0.03	0.05
Selling assets	0.01	0.02	0.07	0.05	0.16***	0.11***
Number of individuals	**35**	**70**	**94**	**214**	**658**	**665**
Lowest income quintile						
Savings	0.15	0.14	0.12*	0.21*	0.11***	0.24***
Relatives/friends	0.55	0.41	0.45	0.45	0.24**	0.17**
Money from working	0.20	0.45	0.33*	0.19*	0.33	0.22
Borrowing: bank, employer	0.04	0.00	0.05	0.13	0.03	0.06
Selling assets	0.05	0.00	0.04	0.02	0.21	0.24
Number of individuals	**35**	**11**	**81**	**53**	**352**	**113**

Notes:

1. Statistics reflect shares of individuals reporting. Sampling weights used.
2. T-tests of equality of means were conducted across the two groups within each region. *** p<0.01, ** p<0.05, * p<0.1.
3. High-income countries are excluded from the table.
4. Sample sizes are for individuals in market agriculture in the specified income quintile who reported they would be able to secure funds in an emergency. This was a follow-up question in the Findex to determine the source of funds.
5. Additional sources of emergency funds asked by the survey included private lender, some other source, and "don't know." These collectively made up a very small share of responses.

Controlling for income quintile, we find that individuals with a financial account were significantly more likely to rely on savings and less likely to rely on support from family and friends. While this was less likely for individuals in the lowest income quintile than for individuals in the highest income quintile, it was still much greater than for those without an account at a financial institution.

Receiving money from an employer also formed another potential source of emergency funds, although no systematic pattern appeared between this source and financial account ownership. Interestingly, very few individuals turned to borrowing from a financial institution in the event of an emergency.

2.5 Which Dimensions of Financial Inclusion Matter More for Individuals in Market-Based Agriculture?

Programs like the World Bank's Universal Financial Access 2020 initiative have tried to expand global access to financial accounts, with the notion that these accounts can serve as a pathway to other financial services. As we discuss in this section, however, types of accounts and how those accounts are used can vary across individuals, particularly for those engaged in agriculture. By only focusing on individuals with an account with a financial institution, we would not be able to gain a complete measure of financial inclusion; thus, measurement of financial inclusion must be more broadly based to account for different financial products developed over time to improve financial services.

Account ownership can take different forms, particularly in harder-to-reach areas. Table 2.3 presents summary statistics across different dimensions of financial inclusion for individuals in market-based agriculture—ownership of financial accounts,[11] mobile money accounts,[12] and saving, borrowing, and sending/receiving remittances across financial institutions and other sources. We also present summary statistics by region. Table 2.3 shows that the share of individuals in market-based agriculture with financial accounts in 2017 ranged from a low of 24% in SSA to a high of 51% in South Asia; overall, shares of account ownership among these individuals were significantly lower than compared to the total sample across countries.[13]

11 The Global Findex defines a financial account as an account at a bank or another type of financial institution, such as a credit union, cooperative, or microfinance institution.

12 The definition of a mobile money account in the Global Findex is limited to services that can be used without an account at a financial institution. In the data, this variable was constructed based on whether the individual had used a mobile phone to pay bills or to send or receive money in the last 12 months.

13 Results available upon request.

Use of mobile money accounts also varied substantially across regions in 2017. Access to infrastructure and lower levels of education and income are likely factors that pose constraints to formal account ownership in more agricultural economies; mobile banking thus presents one potential solution to these constraints.

Table 2.3: Share of Individuals in Market-Based Agriculture Engaging in Financial Activity, 2017 Round

	East Asia and the Pacific	Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa
Has a financial account[a]	0.43	0.47	0.41	0.32	0.51	0.24
Has mobile money account (separate from a financial account)[b]	0.05	0.14	0.14	0.01	0.08	0.30
Used a mobile phone for any financial transactions (includes mobile money account holders)						
Full sample	0.17	0.24	0.26	0.07	0.14	0.39
Those without financial account	0.05	0.11	0.17	0.01	0.08	0.30
Has saved in last 12 months						
With a financial institution	0.21	0.17	0.19	0.17	0.21	0.13
Savings clubs	0.13	0.09	0.15	0.09	0.20	0.32
Borrowed in last 12 months						
Institutional finance	0.25	0.19	0.22	0.06	0.12	0.09
Informal sources	0.05	0.04	0.05	0.03	0.10	0.16
Sent/received domestic remittances in last 12 months						
In cash	0.13	0.17	0.12	0.19	0.15	0.16
Through financial institution	0.19	0.15	0.23	0.11	0.10	0.15
Through mobile phone	0.06	0.05	0.09	0.01	0.05	0.28
Through money transfer operator	0.06	0.03	0.04	0.05	0.02	0.04
Total respondents in market-based agriculture	**3,130**	**2,796**	**1,015**	**515**	**1,548**	**8,687**

Notes: Statistics reflect shares of individuals reporting. High-income countries are excluded from the table.

[a] Financial account = accounts at a bank or another type of financial institution, such as a credit union, cooperative, or microfinance institution.

[b] The definition of a mobile money account in the Findex data is limited to services that can be used without an account at a financial institution. In the data this variable was constructed by whether the individual had used a mobile phone to pay bills or to send or receive money in the last 12 months.

Interestingly, Table 2.3 also shows that a significant share of individuals in market-based agriculture did save and borrow money; we also found that savings and borrowing rates among this group often exceeded those in the rest of the population. Across countries in EAP, for example, 21% of individuals in market-based agriculture saved with financial institutions (including microfinance institutions), while 32% in SSA saved with savings clubs. Around 22% and 25% of individuals across LAC and EAP, respectively, borrowed from financial institutions, and 16% from informal sources in SSA. These individuals also saved and borrowed across all different types of expenses (Table 2.4)—farm/business purposes and old age/medical expenses, for example. In particular, we found that saving and borrowing for farm/business purposes was much greater for individuals in market-based agriculture than for the total sample, underscoring the demand for financial services in the agricultural sector. A greater share of individuals engaged in market-based agriculture also sent and received domestic remittances, particularly cash remittances.[14] For agricultural finance in particular, MFIs may provide a better channel through which to target smallholders.

Table 2.4: Purpose of Saving and Borrowing, 2017 Round

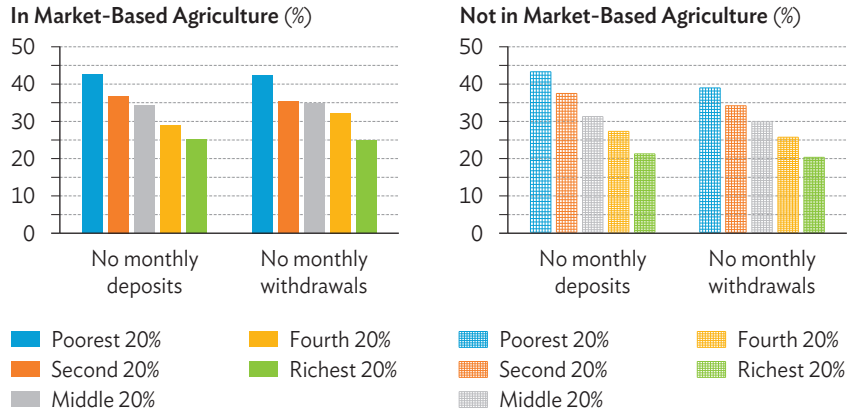
	East Asia and the Pacific	Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa
Saved in last 12 months for:						
Farm/business purposes	0.25	0.21	0.32	0.25	0.18	0.32
Old age	0.27	0.19	0.20	0.15	0.19	0.14
Borrowed in last 12 months for:						
Farm/business purposes	0.20	0.14	0.20	0.11	0.15	0.20
Medical expenses	0.13	0.14	0.18	0.12	0.18	0.24

Notes: Statistics reflect shares of individuals reporting. High-income countries are excluded from the table.

[14] Comparisons against the total sample available upon request.

Participation in financial activities, therefore, can vary widely by type of account ownership, borrowing, savings, and other dimensions. Having a financial account does appear to act as a gateway to other services that are typically linked to these accounts; in separate results, for example, we found that having a financial account was strongly positively associated with having a debit or credit card and formal savings. Among those who did not have a financial account, nearly none were engaged in these services. Figure 2.3 shows that the share of account holders who did not make monthly deposits or withdrawals from their account was also quite high, both for overall individuals in market-based agriculture and for those at the lower end of the income distribution. These shares were much lower for the sample not engaged in agriculture. While agriculturalists have cash flows that are much more seasonal, and hence deposits and withdrawals that are more irregular, the lack of transactional activity even on a monthly basis still highlights important gaps in our understanding of how financial accounts can better address smallholders' needs—particularly given the significant activity observed earlier among agriculturalists in terms of savings, borrowing, and transfers. Some potential channels through which this understanding can be increased at the country level include a better examination of agriculturalists' types of earnings, financial literacy, and motivation, as well as their access to formal institutions and markets.

Figure 2.3: Percent of Individuals with a Financial Account Who Do Not Make Monthly Deposits/Withdrawals, by Income Quintile, 2017 Global Findex



Source: 2017 Global Findex.

Figure 2.4 presents the distribution of financial activities across individuals in market-based agriculture for the countries covered in this book (Bangladesh, India, Thailand, Viet Nam, Peru, Nicaragua, Ethiopia, and Uganda). Looking at Figure 2.4a, among those without a financial account, borrowing from financial institutions was also low (ranging from 5% to 15% of respondents, with the exception of Viet Nam at 35%, reflecting important cross-country differences). Among individuals in market-based agriculture with a financial account (Figure 2.4b), on the other hand, use of financial services across the board was substantially higher, albeit with variations across countries as well. Mobile banking activity was low across countries, for example, except in Uganda, reflecting different access issues and target groups across countries. In all countries, however, financial account ownership matters substantially for engagement in other types of financial services.

Although we do not discuss weather-indexed insurance in detail in this chapter, these products form another financial instrument being explored in agricultural areas. The post-2011 rounds of the Findex did not include a question regarding weather insurance, but the 2011 round showed that only about 5%–9% of individuals across regions reported purchasing crop/rainfall/livestock insurance.[15] These shares were likely to be even lower among agriculturalists, since the 2011 round—unlike the 2014 round—did not include a specific question that identifies all individuals who work in the agricultural sector.

2.5.1 Financial Inclusion and Its Constraints

Table 2.5 presents the reasons reported by individuals engaged in market-based agriculture for not owning a financial account in 2017 across different regions. Multiple responses were permitted. Lack of money was an overarching constraint to account ownership among individuals in market-based agriculture, as was geographical access (financial institutions located too far away). Across most regions, individuals in market-based agriculture were also somewhat more likely than the total sample to report a lack of documentation as another constraint; these individuals were also somewhat less likely to report that they had "no need" for a financial account (results for total sample available on request).

[15] Across regions, the shares of individuals in 2011 who reported purchasing this type of insurance were 9.2% (EAP), 7.4% (ECA), 6.1% (LAC), 4.5% (MENA), 5.2% (SAR), and 8.4% (SSA).

Figure 2.4: Percent of Individuals in Market-Based Agriculture Who Engage in Electronic/Mobile Banking, Saving, and Borrowing, 2017 Global Findex

Notes:

1. For the 2017 round, the share of individuals in market-based agriculture with a financial account was 39% in Bangladesh, 86% in India, 90% in Thailand, 19% in Viet Nam, 30% in Peru, 16% in Nicaragua, and 33% in Ethiopia and Uganda.
2. Financial institutions (e.g., for borrowing and saving) included microfinance groups.

Table 2.5: Reasons for Not Owning a Financial Account, for Individuals Involved in Market-Based Agriculture, 2017 Round (%)

	East Asia and the Pacific	Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa
Lack of money	73	56	61	71	69	78
Too far	33	23	36	20	32	33
Too expensive	24	28	53	29	26	31
Lack of documentation	27	20	23	6	15	29
Family member already has one	16	24	28	6	20	8
Lack of trust	12	26	34	19	18	16
Religious reasons	8	7	10	7	11	7
No need	36	44	34	31	29	16
Number of individuals without final account	**1,816**	**1,456**	**592**	**317**	**719**	**6,384**

Notes:

1. Statistics reflect shares of individuals reporting.
2. Financial account = accounts at a bank or another type of financial institution, such as a credit union, cooperative, or microfinance institution. Adults using a mobile money account linked to their financial institution are considered to have an account at a financial institution.

Although many individuals in market-based agriculture reported other reasons for not owning a financial account (including accounts being too expensive), these differences were not statistically significantly different from the rest of the sample. In the following analysis, we also examine the relative impacts of income and education on these constraints.

2.5.2 Econometric Analysis: Relative Effects of Education and Income on Financial Inclusion

Understanding the correlation of socioeconomic characteristics with measures of financial inclusion is an important starting point for policy targeting. In this section, we examine socioeconomic correlates of financial account ownership, including whether respondents have savings or borrowing across institutional and informal sources and whether they sent/received remittances across different sources.

Although the Findex does not include a broad set of socioeconomic variables beyond education and income, we can examine some interesting links between the relative importance of education and income for different indicators of financial access and participation, as well as whether there are any constraints that individuals in and outside of market-based agriculture face regarding financial account ownership.

Using probit regressions on the 2017 data, Table 2.6 presents correlations of socioeconomic and demographic variables from the Findex with different dimensions of financial activity, as discussed in Section 2.3. These dimensions include financial account ownership, credit/debit card use, mobile banking, and remittances, as well as savings and borrowing from financial institutions (which, as discussed earlier, include microfinance institutions) and from less formal sources. In addition to examining the correlation with agricultural work, the regressions controlled on the right-hand side for age, gender, level of education (primary/secondary/tertiary), income quintile, and region of residence. Whether the respondent worked in market-based agriculture was also interacted with these last three variables.

Table 2.6 shows that market-based agriculturalists, consistent with the descriptive findings earlier, were significantly less likely to have a financial account, as well as a credit or debit card, controlling for other variables. Similar to trends observed in Table 2.3, Table 2.6 shows that sending remittances (whether cash or through a microfinance or more formal institution) was also significantly higher among market-based agriculturalists, as was institutional borrowing (mainly attributable to microfinance), borrowing from informal sources, and participation in informal savings clubs. In addition to the role of agriculture, education and income also matter for financial inclusion. As expected, Table 2.6 also shows a strong positive association between higher overall education and income overall and more formal financial activity. In terms of income, this correlation is strongest for those in the highest income quintiles. Looking at the interaction of agriculture with education, income, and region, we find that the strongest associations are in the latter—with greater mobile banking activity among agriculturalists in LAC and ECA, as well as greater remittance activity and savings with financial institutions within LAC and SAR, as well as greater borrowing from informal sources (and less borrowing from formal sources) in SAR. These geographic differences are highlighted further in the book across different countries, providing important local context for how policies can be designed going forward.

Table 2.6: Probit Regressions: Correlates of Financial Activity, 2017

				Sent/Received Remittances:	
	(1)	(2)	(3)	(4)	(5)
	Has financial account	Has credit/ debit card	Has mobile banking account	Cash	Financial Inst.
Works in market-based agriculture (*agr*)	**−0.235****	**−0.388*****	**0.121**	**0.109****	**0.235*****
Female	−0.169***	−0.181***	−0.142***	0.008	−0.035*
Age	0.010***	0.006***	−0.007***	0.000	−0.004***
Education:					
Primary or less	−0.592***	−0.631***	−0.401***	−0.030	−0.419***
Tertiary or more	0.617***	0.592***	0.387***	−0.067**	0.248***
Income quintile:					
Poorest 20%	−0.233***	−0.228***	−0.208***	−0.060**	−0.156***
Second 20%	−0.097***	−0.095***	−0.068***	−0.018	−0.083***
Fourth 20%	0.115***	0.126***	0.082***	0.020	0.089***
Richest 20%	0.316***	0.322***	0.229***	0.073***	0.272***
Interactions with working in market-based agriculture (*agr*)					
*agr.**primary education	0.078*	0.035	−0.091	0.115***	−0.059
*agr.**tertiary education	−0.016	0.018	−0.111	−0.028	0.077
*agr.**poorest income quintile	0.111***	0.074*	0.071	−0.038	−0.068
*agr.**second 20% income quintile	0.049	0.037	0.051	0.027	−0.030
*agr.**fourth 20% income quintile	0.032	−0.025	−0.005	0.048	0.016
*agr.**highest 20% income quintile	0.081**	0.035	0.049	−0.005	0.063
Region dummies					
ECA	−0.234	−0.146	−0.246	0.099	−0.422***
LAC	−0.430*	−0.403	−0.117	−0.192*	−0.298**
MENA	−0.441*	−0.511*	−0.286	−0.006	−0.644***
SAR	0.058	−0.624*	−0.134	−0.068	−0.628***
SSA	−0.517**	−0.657**	0.873***	−0.016	−0.067
ECA**agr*	0.021	0.219*	0.503**	0.098	0.026
LAC**agr*	0.261*	0.257*	0.438***	0.119	0.310***
MENA**agr*	0.206	0.293*	−0.626*	0.222*	0.289
SAR**agr*	0.238	0.210	0.220*	0.167**	0.236**
SSA**agr*	0.076	0.195	0.227*	0.109*	−0.123

continued on next page

Table 2.6: ***Continued***

	Sent/Received Remittances:		Savings:		Borrowing:	
	(6)	(7)	(8)	(9)	(10)	(11)
	Has mobile phone	Has used MTO	Financial Inst.	Savings Club	Financial Inst.	Informal Sources
Works in market-based agriculture (*agr*)	**0.058**	**0.125**	**0.060**	**0.253*** **	**0.426*** **	**0.264*** **
Female	−0.091***	−0.008	−0.100***	0.171***	−0.054***	0.167***
Age	−0.007***	−0.002**	0.003***	−0.003***	0.000	−0.002**
Education:						
Primary or less	−0.380***	−0.067	−0.431***	−0.126***	−0.244***	−0.072*
Tertiary or more	0.213***	−0.014	0.439***	0.011	0.279***	−0.034
Income quintile:						
Poorest 20%	−0.187***	−0.120***	−0.285***	−0.183***	−0.113***	−0.138***
Second 20%	−0.059**	−0.050	−0.149***	−0.070***	−0.030	−0.036
Fourth 20%	0.117***	0.021	0.126***	0.084***	0.053***	0.093***
Richest 20%	0.256***	0.078**	0.389***	0.167***	0.114***	0.125***
Interactions with working in market-based agriculture (*agr*)						
*agr.**primary education	−0.073	−0.022	0.042	−0.016	0.076	−0.033
*agr.**tertiary education	0.022	0.051	−0.054	−0.093	−0.007	−0.052
*agr.**poorest income quintile	0.037	0.102	0.075	−0.018	0.024	−0.020
*agr.**second 20% income quintile	−0.053	0.059	0.057	−0.011	−0.026	−0.043
*agr.**fourth 20% income quintile	−0.074*	0.104*	0.043	0.029	0.061	0.030
*agr.**highest 20% income quintile	−0.035	0.076	0.021	−0.015	0.101**	0.002
Region dummies						
ECA	−0.506**	−0.497**	−0.568***	−0.442***	−0.171	−0.484**
LAC	−0.328	−0.274	−0.483***	−0.139	−0.176	−0.085
MENA	−1.335***	−0.424	−0.526***	−0.242	−0.364*	−0.176
SAR	−0.384	−0.576**	−0.222	0.150	−0.339*	0.232
SSA	0.829***	−0.142	−0.333**	0.501***	−0.428***	0.437**
ECA**agr*	0.305	0.111	0.159	0.251**	−0.160	0.319***
LAC**agr*	0.496***	−0.036	0.243**	0.171	0.015	0.095
MENA**agr*	0.519**	0.250**	0.353***	0.127	−0.565***	0.003
SAR**agr*	0.316	0.162	0.224**	0.141	−0.129	0.136
SSA**agr*	0.252*	−0.143	0.033	0.174*	−0.238**	0.224**

ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, MTO = money transfer operator, SAR = South Asia, SSA = sub-Saharan Africa.

Notes:

1. Weighted probit estimates. Sample size (number of individuals): 111,001. Standard errors adjusted for clustering at the country level. *** p<0.01, ** p<0.05, * p<0.1. High-income/Organisation for Economic Co-operation and Development countries are not included in the sample.
2. Omitted category for education is secondary schooling. Omitted category for income quintile is the middle 20%. Omitted category for region is East Asia and the Pacific.

Table 2.7: Probit Regressions: Correlates of Reasons for Not Having a Financial Account, 2017

	(1)	(2)	(3)	(4)	(5)
	Lack of Money	Too Far	Lack of Documentation	Too Expensive	Could not Get an Account
Works in market-based agriculture (*agr*)	**0.238****	**0.113**	**0.063**	**0.052**	**−0.275*****
Female	0.047***	−0.074***	−0.046**	−0.074***	0.114***
Age	0.002**	−0.001	−0.011***	0.002**	−0.007***
Education:					
Primary or less	0.049	0.150***	0.073**	0.025	−0.225***
Tertiary or more	−0.058	−0.134***	−0.162***	−0.045	−0.045
Income quintile:					
Poorest 20%	0.054*	0.095***	0.019	0.052***	−0.151***
Second 20%	0.051**	−0.005	0.015	0.047**	−0.047**
Fourth 20%	−0.074***	−0.106***	−0.023	−0.063***	0.038
Richest 20%	−0.199***	−0.162***	−0.026	−0.087***	0.159***
Interactions with working in market-based agriculture (*agr*)					
agr.*primary education	0.012	−0.036	0.038	−0.064	0.072
agr.*tertiary education	−0.122	0.308***	0.284**	0.203**	0.018
agr.*poorest income quintile	−0.091	0.018	−0.066	0.010	−0.002
agr.*second 20% income quintile	−0.068	0.102**	−0.050	0.021	−0.020
agr.*fourth 20% income quintile	0.004	0.120***	−0.077**	0.055	−0.022
agr.*highest 20% income quintile	−0.014	0.206***	−0.016	0.131***	0.044
Region dummies					
ECA	−0.364***	−0.349***	−0.219	0.171	−0.070
LAC	−0.141	−0.010	−0.053	0.784***	−0.090
MENA	0.154	−0.618**	−0.598***	0.051	−0.499**
SAR	−0.073	−0.115	−0.256*	0.099	−0.021
SSA	0.161	−0.053	0.021	0.245	−0.596***
ECA**agr*	−0.030	0.127	0.072	−0.046	0.158*
LAC**agr*	−0.137	0.117	−0.079	0.054	0.353***
MENA**agr*	−0.165	0.247	−0.390***	0.091	−0.060
SAR**agr*	−0.011	0.100	−0.135	−0.020	0.114
SSA**agr*	0.046	0.084	−0.034	0.036	0.131

continued on next page

Table 2.7: ***Continued***

	(6)	(7)	(8)	(9)
	Family Already Has One	Lack of Trust	Religious Reasons	No Need
Works in market-based agriculture (*agr*)	**0.008**	**0.143**	**0.058**	**0.238****
Female	−0.119***	−0.080***	−0.024	0.047***
Age	0.001	0.000	−0.001	0.002**
Education:				
Primary or less	−0.090**	0.149***	−0.115***	0.049
Tertiary or more	0.037	0.014	0.014	−0.058
Income quintile:				
Poorest 20%	−0.048*	0.052	−0.050*	0.054*
Second 20%	−0.020	0.009	−0.026	0.051**
Fourth 20%	−0.018	−0.040	0.021	−0.074***
Richest 20%	0.031	0.022	0.079***	−0.199***
Interactions with working in market-based agriculture (*agr*)				
agr.*primary education	−0.029	−0.060	−0.026	0.012
agr.*tertiary education	0.008	0.134	0.102	−0.122
agr.*poorest income quintile	0.147***	0.032	−0.022	−0.091
agr.*second 20% income quintile	0.130***	0.060	0.079*	−0.068
agr.*fourth 20% income quintile	0.020	0.050	0.055	0.004
agr.*highest 20% income quintile	0.035	0.173***	−0.018	−0.014
Region dummies				
ECA	0.496***	0.002	0.244**	−0.364***
LAC	0.638***	0.142	−0.152	−0.141
MENA	0.169	0.202	−0.170	0.154
SAR	0.271*	0.306*	−0.141*	−0.073
SSA	0.276**	0.105	−0.601***	0.161
ECA**agr*	−0.051	−0.062	−0.097	−0.030
LAC**agr*	0.047	−0.050	0.059	−0.137
MENA**agr*	0.067	−0.206	−0.026	−0.165
SAR**agr*	−0.050	−0.129	−0.058	−0.011
SSA**agr*	−0.078	−0.171*	−0.038	0.046

ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SAR = South Asia, SSA = sub-Saharan Africa.

Notes:

1. Weighted probit estimates. Sample size (number of individuals without a financial account): 64,389. Standard errors adjusted for clustering at the country level. *** p<0.01, ** p<0.05, * p<0.1. High-income/Organisation for Economic Co-operation and Development countries are not included in the sample.
2. Omitted category for education is secondary schooling. Omitted category for income quintile is the middle 20%. Omitted category for region is East Asia and the Pacific.

Table 2.7, which displays socioeconomic correlates of reasons for not owning a financial account (using similar probit regressions as those used in Table 2.6), also highlights the main constraints to account ownership for individuals in market-based agriculture. Working in market-based agriculture overall was associated with a 24% greater probability of reporting that lack of money was a key factor, for example, as well as a similar probability of reporting that they did not actually need an account (looking at the income quintile estimates, this was more likely to be reported among poorer respondents as well). The overall effect of being in market-based agriculture was not significant for other reported constraints, even though Table 2.5 showed that a large share of market-based agriculturalists reported a lack of money and documentation as other main reasons for not owning an account. Interactions with education and income did matter, however. For example, agriculturalists with the highest levels of education and in the highest income quintile were significantly more likely to report geographic distance, lack of documentation, cost, and lack of trust as reasons for not having an account, whereas those at the lowest income quintiles were more likely to report that their family already had an account. As also seen with Tables 2.6 and 2.7, therefore, within market-based agriculture, financial activity and perceived constraints were associated most strongly with those in the highest income quintile or educational level. This is also an important policy issue to examine further within countries in order to understand how demand for financial products varies across the distribution of income.

2.6 Conclusion

Given the policy interest in expanding financial services to agricultural households, policymakers need a better understanding of households' constraints to owning financial accounts, as well as to participation in other financial activities (savings, borrowing, and remittances). Using the Global Findex, a large, individual-level, cross-country dataset with detailed measures of financial inclusion, we find that financial account ownership, especially the ability to conduct transactions through credit/debit cards, is strongly associated with country-level measures of agricultural productivity. Access to markets can also be eased with financial accounts that allow for cashless transactions. We also find that there is demand for financial services among individuals in market-based agriculture; poorer and less educated individuals who receive agricultural incomes report a relatively high degree of savings and borrowing and are also much more likely to save and

borrow for their farm/business. Using institutional data across regions, we see that MFI activity in agriculture is strongly positively associated with borrowing among market-based agriculturalists in the lowest income quintiles as well. However, regressions show that financial activity, particularly interactions with financial institutions, is concentrated among market-based agriculturalists with higher levels of education and income. The most important constraint to reported financial account ownership, controlling for other factors, is geographic distance; this constraint is felt significantly among more well-to-do agriculturalists.

In order to meet the demand for financial services among individuals in market-based agriculture, policymakers need to better understand how demand varies across the distribution of income, as well as to lighten constraints to financial account ownership. Mobile banking provides one option that has spread in several countries, particularly in sub-Saharan Africa, to connect harder-to-reach areas; however, as the Findex data show, mobile banking still has a long way to go in terms of increasing coverage. The regression analysis also finds that while education and income are important across the entire sample of respondents, there is a significantly greater association between education and income and financial inclusion for agriculturalists, underscoring the lower access to financial institutions that exists within agriculture more broadly.

Overall, the global data analysis in this chapter aims to help inform policymakers interested in cross-country evidence on constraints to financial inclusion in agriculture. While agricultural households face higher risks and fluctuations in income, this chapter shows that there is strong demand for financial services among these households and that education often plays a strong role in that demand. These are useful starting points for further analysis and policy efforts in this area.

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CHAPTER 3

Thailand: Mature Farm Lending with State-Owned Banks for Agriculture

Jonathan Haughton

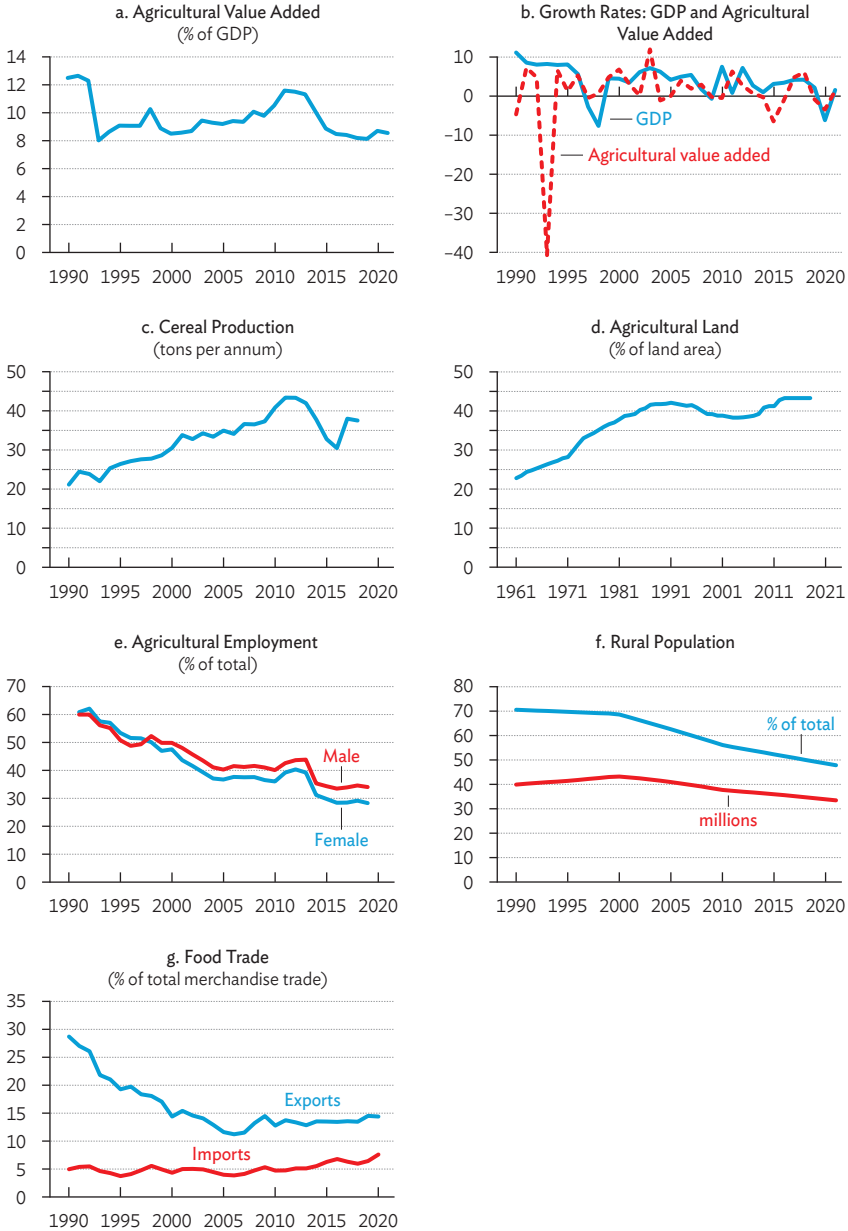
3.1 Introduction

Thailand's agricultural sector accounts for just over 8% of the country's gross domestic product (GDP) and more than one-third of all employment (Figure 3.1a). The share of agriculture in GDP has hardly changed since 2015, although its growth has been volatile and poorly synchronized with the growth of overall GDP (Figure 3.1b). Thailand's production of cereals, for instance, rose from 25 million tons in 1995 to more than 40 million tons in 2012 (Figure 3.1c), helping maintain the country's position as the world's largest exporter of rice, but production has fallen since then, and in 2021/2022 the country was only the third largest rice exporter, after India and Viet Nam; unlike Viet Nam and India, where rice yields per hectare have risen by about 40% since 2000, there has been almost no increase in rice yields in Thailand over the same period.

Thailand is the world's largest exporter of rubber and cassava, and it is a major exporter of sugar. In addition, a diverse selection of other crops contribute significantly to agricultural production, as does livestock; at the time of the 2013 agricultural census—the most recent available—farmers in Thailand had 251 million hens, 6.6 million pigs, and 3.7 million cattle.

Thailand's rising agricultural output (excluding rice) stems from increased productivity. After increasing substantially in the 1960s and 1970s, the amount of land devoted to agriculture reached a peak in 1991 and remains at essentially the same level today (Figure 3.1d). On the other hand, the amount of labor employed in agriculture has contracted sharply. In 1990, 60% of both male and of female workers were employed in agriculture; by 2019, the proportions had fallen to 34% for men and 28% for women (Figure 3.1e), although there appears to have been a temporary reversal of this trend in 2020/2021 as urban-to-rural migration took place as a result of the effects of the coronavirus disease (COVID-19) pandemic.

Figure 3.1: Evolution of the Agricultural Sector in Thailand, 1990–2021



GDP = gross domestic product.

Source: Data from World Bank (2017).

The secular decline in agricultural labor has been associated with a relative decline in the rural population, from 70% of the total population as recently as 2000 to 48% in 2021 (Figure 3.1f).

Despite the decline in the rural population, Thai agriculture remains overwhelmingly dominated by small-scale family-owned farms (Table 3.1). Of the 5.9 million farm holdings enumerated in the 2013 agricultural census, 37% are smaller than 10 rai (1.6 hectares), 51% are between 1.6 and 6.4 hectares, and only 0.4% are larger than 22.4 hectares. These larger farms collectively account for just 6% of all agricultural land. Almost 87% of all farm area and more than 90% of all small farms are owned by their operators (or rented for free), although 40% of farmers lack secure land tenure rights (World Bank 2022). Four out of every five farmers report that all or most of their income comes from agriculture, although this proportion falls below 70% for those on farms smaller than one hectare.

Table 3.1: Agricultural Holdings, Income Source, and Debt Use by Farm Size

Size of Holding (rai)[b]	Agricultural Holdings[a]		Area of Holdings		Income Mainly from Agriculture[d] (%)	Agricultural Debt	
	Number (million)	Breakdown (%)	Breakdown (%)	Owned[c] (%)		Breakdown, Borrowers (%)	Breakdown, Amount (%)
Under 2	331	5.6	0.2	96.9	48	21	1.0
2–5	1,046	17.7	3.3	93.6	68	31	6.2
6–9	821	13.9	5.1	93.0	77	41	7.7
10–19	1,609	27.2	18.6	91.8	83	47	22.2
20–39	1,394	23.6	32.2	88.6	89	55	30.7
40–59	438	7.4	17.9	84.5	92	59	15.4
60–139	241	4.1	16.7	80.4	94	61	13.4
140–	25	0.4	4.6	76.2	94	52	3.3
Total	**5,906**	**100.0**	**100.0**	**86.8**	**80**	**47**	**100.0**

Notes:

[a] Includes aquaculture (which comprises less than 1% of the total).

[b] One rai is 1,600 square meters, or 0.16 of a hectare. 140 rai represent 22.4 hectares.

[c] Includes owned and also rented with zero rental payment.

[d] These households get all or most of their income from agriculture.

Source: Agricultural Census, 2013.

Given the reasonable vigor of much of the agricultural sector, it might appear at first glance that the financial system adequately supports Thailand's agriculture. However, of the 5.9 million farmers counted in the agricultural census of 2013, only 47% had taken out agricultural loans (Table 3.1). Among farmers with less than 10 rai (1.6 hectares) of land, that proportion was just 29%. Thus, we need to ask whether these figures are unreasonably low, and if so, why.

In addition, poverty in Thailand remains a predominantly rural challenge (Wuttisorn 2014). In 2020, 8.8% of rural residents were considered to be poor, compared to 5.4% of urban residents, using the national poverty line. Rural poor people work mainly in agriculture and are not well positioned to take advantage of employment opportunities in other parts of the economy. Thus, we need to ask whether better access to agricultural finance could significantly improve the economic position of rural poor people.

Finally, the government plays an active role in Thailand's agricultural sector—for instance, supporting rubber farmers when rubber prices collapsed after 2011, setting and maintaining (unsustainably) high prices for rice in 2012, and funding irrigation projects. Thus, the government constitutes a significant source of finance for agriculture that requires examination.

This chapter is organized as follows. First we determine whether farmers have at least some access to Thailand's financial system. We then summarize the main components of the financial system as it pertains to farmers, paying particular attention to the Bank for Agriculture and Agricultural Cooperatives (BAAC), which dominates the agricultural sector, and the Thailand Village and Urban Community Fund (TVF or "Village Fund"), which reaches one-third of farm households. Next, we examine the impact that greater access to credit can have on farm incomes and production. After analyzing the financial system, we turn to the role played by government in providing financial support for agriculture. The final section of the chapter summarizes our findings and suggests some possible directions for policymaking.

3.2 Are Farmers Banked?

To determine whether farmers have access to the financial system in Thailand, we utilize data collected in 2014 and 2021 by the Gallup Organization for the Global Financial Inclusion database project, the Global Findex (Demirguc-Kunt et al. 2015). The Thai data for each year come from interviews with 1,000 individuals aged 15 years or older, chosen to be representative (after the use of sampling weights) of the population at large.

The survey did not identify farmers per se, but it did ask whether the respondent "received agricultural payments in the last 12 months;" a weighted total of 12.5% responded affirmatively in 2021. This is lower than the 30% of the labor force that works in the agricultural sector (Figure 3.1e), although part of that labor force may not receive "agricultural payments" if they are laborers, or they may produce solely for home consumption. Nonetheless, we refer to these respondents as "farmers" in the rest of this section. The survey data also allow us to separate respondents into quintiles based on household income.

The surveys show that 99.7% of farmers and 95.6% of nonfarmers had a bank account in 2021, up from 87.4% and 72.7% respectively, in 2014 (Table 3.2). Thus, the banking sector has achieved almost universal coverage.

The Findex data show that 55% of farmers and 56% of nonfarmers borrowed in 2021. For farmers, the figure was essentially unchanged from 2014. Only farmers in the richest quintile had borrowing rates substantially below this level, presumably because they had less need to borrow. Almost two-thirds of households reported having financial savings, although the rate was significantly lower for households in the bottom quintile.

The Findex questionnaire in 2014 (but not 2021) asked about the purpose of the borrowing. An estimated 18% of farmers and 10% of nonfarmers reported borrowing for "farm/business purposes." These numbers may seem low, given that the agricultural census found that 47% of farmers had "agricultural debt." However, if "agricultural debt" refers to all types of debt, then this is consistent with the Findex finding that just over half of farmers were borrowers.

Table 3.2: Indicators of Financial Inclusion from Findex Survey, 2021

Income Quintile	Farmers				Nonfarmers			
	Have an Account (%)	Borrow (%)	Save (%)	N	Have an Account (%)	Borrow (%)	Save (%)	N
1. Poorest	100.0	59.8	37.4	18	95.0	49.3	40.4	100
2.	100.0	37.7	66.9	17	99.4	58.4	59.0	114
3. Middle	100.0	65.3	75.1	24	94.8	51.6	74.6	159
4.	100.0	40.4	71.4	31	99.5	58.0	79.5	251
5. Richest	97.5	83.9	94.2	26	89.3	63.7	84.6	272
Total for 2021	**99.7**	**55.4**	**64.5**	**116**	**95.6**	**56.3**	**67.8**	**896**
Total for 2014	**87.4**	**55.5**	**86.0**	**356**	**72.7**	**47.3**	**77.4**	**644**

N = number of observations.

Notes: "Farmers" are defined as those who "received agricultural payments in the past 12 months" and consist of 12.5% of the (weighted) sample, which collected information from 1,017 individuals aged 15 and above.

Source: Findex surveys for Thailand, 2021 and 2014.

The Findex data come from a comparatively small sample and are based on straightforward questions, but they do point to several conclusions. First, the majority of farmers appear to have enough contact with the financial system to open an account if they so choose; thus, financial inclusion extends to almost all farmers. Second, despite the government's push for a cashless society, most farmer transactions are still in cash, although the use of mobile money is rising rapidly.

These conclusions should not come as a surprise. A study by the Bank of Thailand based on survey data from 2006 found that at that time, only 9.6% of households did not use any financial services and just 4.4% lacked access to savings products (Ariyapruchya, Sinswat, and Chutchotitham 2008). The main concern of that report was not financial exclusion per se, but rather the problem of inadequate financial literacy, a concern that has been echoed more recently by a study of farmer finance by Chantarat, Ratanavararak, and Chawanote (2022).

A third conclusion the Findex data point to is that it remains unclear whether poor farmers are underserved by the financial system. Poor farmers' borrowing rates, whether solely for agricultural purposes or overall, are comparable to those of better-off farmers (Table 3.2). On the other hand, borrowing rates remain low among the smallest farmers (Table 3.1). Moreover, simply knowing whether an individual borrowed does not allow us to adequately measure the potential unmet need for credit or the sources and terms of that credit. Before examining this issue in more detail, we first need to summarize the main features of Thailand's financial system as it relates to the agricultural sector.

3.3 The System of Agricultural Finance

In this section, we examine the nature and extent of lending to farmers over time. Some of the most useful data come from the agricultural censuses of 1993, 2003, and 2013, as well as from the intercensal survey of 1998 (Table 3.3). Although the number of farm holdings rose between 1993 and 2013, we have seen elsewhere that the number of people in Thailand who rely on farming has steadily fallen; this implies that fewer people derive their living from farming, even if they are part of a land-using household.

The proportion of farmers who had "agricultural debt" rose from 43% in 1993 to 55% in 2003 and then fell to 47% in 2013. The high proportion in 1998 (49%) may reflect farmers' need to borrow in the wake of the 1997 Asian financial crisis, which originated in Thailand. The even higher proportion seen in 2003 (55%) quite likely shows the effect of the introduction of the Village Fund, which became operational in 2002 and injected a million baht into almost every one of Thailand's more than 70,000 villages and urban wards in order to support rotating credit funds.

The most striking feature of the debt data is the overwhelming importance of the Bank for Agriculture and Agricultural Cooperatives, which provided half of all agricultural credit in 1993 and over seven tenths of all agricultural credit in 2013. The appearance of the Village Fund interrupted the rising market share of BAAC for a while, but overall, BAAC has reduced the market share of informal money lenders (from 17% of credit in 1993 to just 3% in 2013), as well as other banks and financial institutions.

Table 3.3: Sources of Agricultural Credit, 1993–2013

	1993	1998	2003	2013
Total number of farm holdings (million)	5,643	5,577	5,808	5,906
of which				
Have agricultural debt/loans (%)	42.8	49.4	55.1	46.9
Value of agricultural debt (million baht)	93,603	153,889	215,199	314,940
of which, from				
BAAC	50.6	67.1	57.9	71.5
Other banks/financial institutions	23.5	11.4	9.9	6.0
Cooperatives and farmer groups	9.4	9.5	9.4	9.4
Village Fund	0.0	0.0	12.3	8.9
Other government agencies	0.0	2.0	1.6	1.2
Middlemen	3.9	1.6	1.6	0.7
Money lenders	5.3	3.1	3.3	1.0
Relatives/Neighbors/Others	7.3	5.3	4.0	1.2
Mean value per loan (baht)	191,639	286,823	328,171	n.a.
Mean borrowing per household (baht)	77,008	129,131	163,159	117,449

BAAC = Bank for Agriculture and Agricultural Cooperatives.

Sources: Agricultural Census of 1993, 2003, and 2013; Intercensal Survey of 1998. National Statistics Office.

In 2013, agricultural value added came to B1,470 billion ($43.2 billion). If physical inputs are equivalent to two-fifths of value added, as suggested later in the chapter by the numbers in the final row of Table 3.12, this represents B588 billion. According to the agricultural census, total agricultural debt came to B315 billion, or about half of the value of agricultural inputs. Of this total, B225 billion was debt contracted with BAAC and represented just two-thirds of new loans extended by BAAC in 2013.

Independently, information on farm credit is available from the socioeconomic surveys undertaken by the National Statistics Office. This source allows us to link credit use to other household sociodemographic characteristics, as well as to information regarding households' geographic location. Table 3.4 provides information for agricultural households only.

Table 3.4: Sources and Amounts of Loans for Agricultural Households, 2002–2013

	2002	2004	2007	2009	2013
Source of main loan for agricultural use (%)					
Commercial banks	1.9	2.5	2.0	2.0	3.1
BAAC	47.9	46.1	49.9	50.0	49.2
Government agencies	0.3	1.3	1.9	1.9	2.1
Other financial institutions	21.8	6.1	8.6	11.1	11.0
Co-ops/welfare organizations	4.4	3.6	5.4	5.2	3.0
Village Fund	10.7	28.0	24.7	23.4	29.2
Outsiders	12.8	12.5	7.4	6.4	2.5
Total	100.0	100.0	100.0	100.0	100.0
% of households with debt	**78.7**	**74.3**	**78.6**	**75.8**	**72.1**
Source of main loan, all uses (%)					
Commercial banks	6.8	7.0	5.6	5.7	9.3
BAAC	31.5	30.9	32.4	32.2	30.8
Government agencies	2.5	5.1	4.9	6.1	7.0
Other financial institutions	21.9	10.0	17.3	19.2	19.6
Co-ops/welfare organizations	8.5	7.2	7.7	7.5	4.5
Village Fund	9.5	22.9	21.0	19.3	23.6
Outsiders	19.0	16.9	11.2	10.1	5.2
Total	100.0	100.0	100.0	100.0	100.0
Source of secondary loan for agriculture (%)					
Commercial banks	1.1	0.5	1.1	1.5	1.3
BAAC	5.1	5.7	7.7	7.2	8.0
Government agencies	0.7	1.6	1.4	1.3	2.3
Other financial institutions	40.9	9.9	9.1	9.5	10.6
Co-ops/welfare organizations	3.9	4.3	3.3	3.0	2.4
Village Fund	21.9	57.1	66.3	67.2	70.8
Outsiders	25.9	20.9	11.1	10.2	4.5
Total	100.0	100.0	100.0	100.0	100.0
% of borrowers with secondary agricultural loan	**38.3**	**53.3**	**53.2**	**52.3**	**45.4**

continued on next page

Table 3.4: ***Continued***

	2002	2004	2007	2009	2013
Size of agricultural debt, by source of main loan (baht)					
Commercial banks	240,192	1,148,181	522,112	586,190	476,509
BAAC	73,027	102,067	117,393	130,151	196,191
Government agencies	222,208	158,879	443,938	509,490	929,062
Other financial institutions	29,001	74,311	178,374	181,561	283,132
Co-ops/welfare organizations	196,300	126,740	250,554	393,448	552,193
Village Fund	25,252	27,212	23,317	23,894	45,420
Outsiders	32,870	52,502	76,258	98,049	102,265
Overall	**62,161**	**100,684**	**117,992**	**138,914**	**193,714**
Size of agricultural debt, if only one loan (baht)					
Commercial banks	164,140	3,444,024	551,207	666,439	319,409
BAAC	58,653	68,726	85,446	96,513	151,238
Government agencies	232,907	78,029	343,717	330,983	340,640
Other financial institutions	24,630	46,949	106,178	124,898	194,635
Co-ops/welfare organizations	80,972	90,920	219,017	281,633	433,476
Village Fund	14,266	14,949	17,361	17,073	38,015
Outsiders	26,122	34,801	38,700	46,035	74,073
Overall	40,275	92,628	70,477	82,264	111,214
Agricultural loans as % of all loans (by value)	**13.3**	**15.1**	**15.2**	**14.2**	**13.5**

BAAC = Bank for Agriculture and Agricultural Cooperatives.

Sources: From socioeconomic surveys of 2002, 2004, 2007, 2009, and 2013.

About three-quarters of agricultural households borrow in a given year; this is about 12 percentage points higher than that of the population as a whole. Nationwide, about 14% of all credit given to all households goes to agricultural purposes (see bottom line of Table 3.4); this is somewhat higher than the agricultural share of GDP and reflects the importance of credit in the agricultural sector.

As borrowed funds are fungible, the bottom half of Table 3.4 shows the sources of all main loans held by agricultural households, rather than only those taken out ostensibly for agricultural purposes. BAAC and the Village Fund play relatively smaller roles in this case. BAAC in particular appears strongly oriented toward providing credit specifically to farmers who plan to use the funds for agricultural purposes.

Approximately half of all borrowing farmers have more than one loan; about 70% of these secondary loans come from the Village Fund. The Village Fund provides subsidized credit in modest amounts to a large proportion of households and is typically the cheapest source of credit; however, loans from the Village Fund are rarely enough on their own, which explains the widespread borrowing from multiple sources. Village Fund loans, at B38,000 per household on average in 2013 (bottom panel of Table 3.4), are much smaller than the average BAAC loan of B151,000 in the same year. The Socioeconomic Surveys did not collect full details on the amounts borrowed from each source or the associated interest rates.

3.4 The Financial Needs of Farmers

Almost half of the Thai population lives in rural areas, and just over a third of this rural population (35%) relies entirely on farming, with a further 12% combining farming with other sources of earnings (Table 3.5). An estimated 11% of the "farming only" households lived in poverty in 2019—using the official poverty line—well above the national average of 6% but substantially lower than the 27% poverty rate observed in 2011. The reduction in farmer poverty occurred despite a 14% drop in net farm profit over this period—it now accounts for 15% of rural income—with the gap filled by higher levels of remittances, social assistance, and "other" income, including in-kind income and pensions (Table 3.6). The diversity of income sources is striking and suggests that future focus should be on rural or poor households rather than farmers per se.

Agricultural households turn to the financial system for a number of distinct services in order to manage liquidity, build wealth, and cope with shocks (Chantarat, Ratanavararak, and Chawanote 2022). They need:

(i) A cheap, simple, and secure payments system. Most agricultural households still use cash for the bulk of their transactions, although this is changing fairly quickly.

(ii) A safe vehicle for savings, both in the short and longer term. An estimated 65% of agricultural households added to their financial savings in 2021 (Table 3.2), but most assets are held in tangible form (e.g., livestock) or cash.

(iii) Credit. There are three conceptually distinct needs here. To cover the gap between paying for inputs and selling the harvest, farmers need short-term working capital. The farm household may also need access to credit to help smooth consumption spending. And many farmers would benefit from longer-term credit in order to finance major investments, such as irrigation, or purchases of larger equipment.

(iv) Insurance against shocks, such as a poor harvest or low prices for their products.

Table 3.5: Income and Poverty for Rural Households, 2011 and 2019

	% of Rural Population	Headcount Poverty Rate		Average Annual Income, $	
		2011	2019	2011	2019
Household Category					
Farming only	35	27	11	5,500	5,200
Diversified	12	18	9	9,700	10,100
Nonfarm only	40	13	6	8,000	9,000
No working members	14	...	10	...	...
All rural households	100	...	...	6,400	6,700

Notes: Poverty rate is based on official poverty line. Incomes are in United States dollars in 2011 constant prices, computed using the Bank of Thailand official exchange rate.

Sources: Socioeconomic Surveys of 2011 and 2019, as reported by World Bank (2022).

Table 3.6: Sources of Income for Rural Households, 2021

	% of All Income
Net profit from farming	15
Wages and salaries	31
Net profit from nonfarm business	11
Remittances	8
Social assistance	12
Other (including pensions, financial income)	23

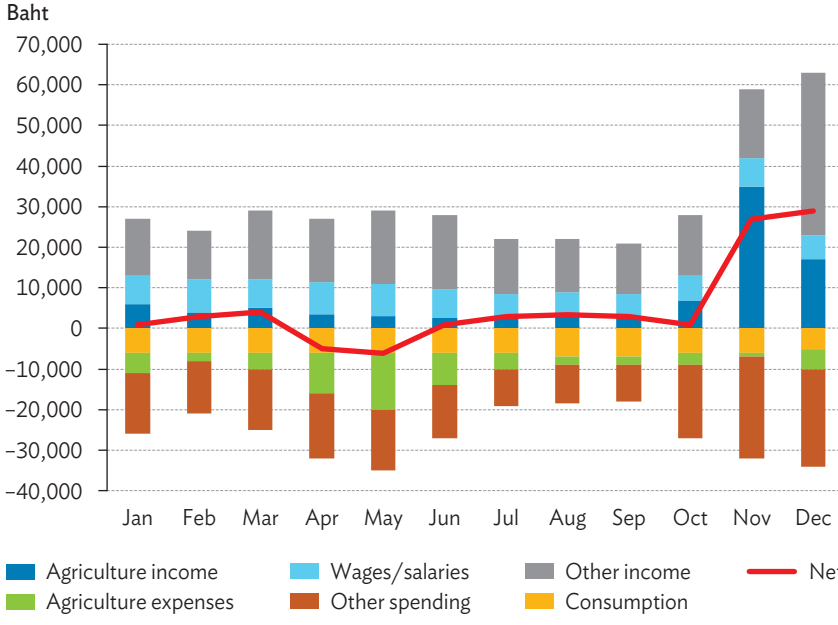
Source: World Bank (2022), Figure 10.

In what follows, we will mainly discuss credit, or what Chantarat, Ratanavararak, and Chawanote (2022) call "the main tool for financial management" by farm households, but will also pay some attention to the other components of financial services for farmers.

A key characteristic of agricultural income is its variability, both from month to month and year to year. Given the cycles of crop planting and harvesting, and the lumpiness of sales, farmers have high expenses in some months and high revenues in others, in ways that vary from crop to crop and region to region within Thailand.

This variability may be seen in Figure 3.2, which shows the monthly revenue and expenses of farm households in northeast Thailand, based on the Farmer Household Financial Behavior Survey of 2019–2020, which surveyed 720 farm households nationwide (Chantarat, Ratanavararak, and Chawanote 2022).

Figure 3.2: Farmer Revenue and Spending, Northeast Thailand, 2019–2020



Source: Based on Chantarat, Ratanavararak, and Chawanote (2022), based on Farmer Household Financial Behavior Survey.

Similar, if sometimes more marked, profiles may be seen in the country's other regions. In some months (April, May), revenues do not cover expenses, while in others (November, December), they are ample. Chantarat, Ratanavararak, and Chawanote report that only 15% of households had no liquidity problems in the course of the year (the "better off"), while 18% never had enough in any month to cover their expenses (the "insufficient") and so became increasingly indebted. The remaining 67% (the "unstable/illiquid") faced liquidity constraints in some months, and most did not have enough income to pay off their outstanding debt.

Based on a large database of one million randomly chosen farm households who borrowed from BAAC, linked with farm registration data, over the period 2014–2021, Chantarat, Ratanavararak, and Chawanote (2022) report that 17% of farm households have debt to asset ratios and debt to income ratios in excess of one (Table 3.7).

Table 3.7: Indebtedness Among Farm Borrowers from the Bank for Agriculture and Agricultural Cooperatives, 2021

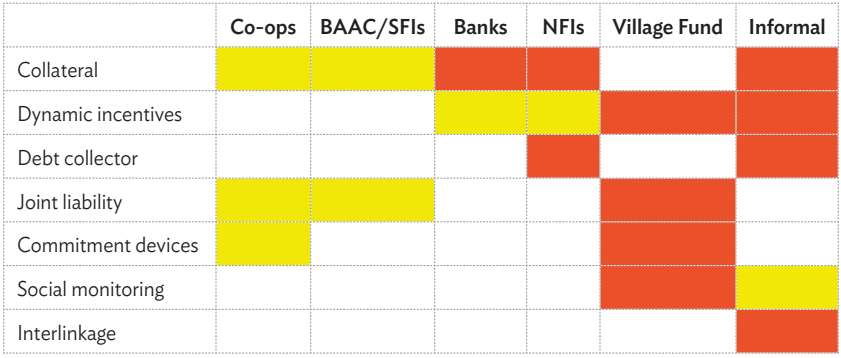
		Debt/Asset Ratio	
		≤1	>1
Debt/income ratio	≤1	43	17
	>1	24	17

Source: Chantarat, Ratanavararak, and Chawanote (2022), based on a sample of one million farmer borrowers from the Bank for Agriculture and Agricultural Cooperatives.

Based on their survey data, Chantarat, Ratanavararak, and Chawanote (2022) estimate that 90% of Thai farm households have debt, which averaged B450,000 (about $12,000) in 2021. The single most important source of loans is BAAC, the specialized financial institution that lends to 65% of farm households. Other important sources of (smaller) loans are the Village Fund (65% of households), informal sources (31%), hire purchase agreements (28%), and savings cooperatives (28%). A majority of borrowers have loans from multiple sources. This borrowing practice is an adaptation to the inflexible nature of many loans, leaving households with short-term liquidity needs from time to time.

When households have more debt than they can manage, they may need to choose which of their loans to repay first. Chantarat, Ratanavararak, and Chawanote develop a model of the probability of loan delinquency as a function of household characteristics. They find that households are least likely to be delinquent on Village Fund or informal loans, and they are most likely to be delinquent on loans from savings cooperatives. Figure 3.3, based on Figure 13b in Chantarat, Ratanavararak, and Chawanote (2022), summarizes the drivers of the perceived cost of default. Interlinkages (in the form of business relationships) are important for informal loans; dynamic incentives (that link the ability to borrow anew to repayment of current loans) are central to the Village Fund loans; and collateral is important for bank loans. In this context, it is worth noting that about 40% of Thai farmers "lack secure land tenure with full land-use rights" (World Bank 2022: 5), which limits the collateral that they can offer.

Figure 3.3: Perceived Cost of Default for Different Loan Sources and Enforcement Mechanisms, 2020



BAAC = Bank for Agriculture and Agricultural Cooperatives, NFI = nonbank financial institution, SFI = specialized financial institution.

Notes: Perceived cost of default is strongest in the red cells and less strong in the yellow cells. Village Fund column includes savings groups.

Source: Chantarat, Ratanavararak, and Chawanote (2022) based on focus group discussion with farmers.

Delinquency or default is high for joint-liability loans, ranging from 14% in the northeast to 24% in the central region. This may seem surprising, because joint liability was seen as one of the key innovations of the microcredit revolution.

Chantarat, Ratanavararak, and Chawanote model the default rate on joint liability loans and find it rises if a higher proportion of the borrowing group is landless or if age differences within the group are large, but it is lower if most members come from the same village or have similar incomes. Many of the joint-liability loans are issued by BAAC, which had a nonperforming loan rate of 12.5% as of late 2022 (Ajanapanya 2022).

3.4.1 Are Farmers Credit-Constrained?

Agricultural households in most of Thailand appear to have access to a variety of potential lenders. BAAC reaches almost all villages and farmers, leading Jessop et al. (2012: 11) to conclude that "unlike most developing countries, smallholder farmers in Thailand have adequate access to credit." However, not all observers agree. Drawing on a survey of almost 2,200 households in the northeast region undertaken between May 2006 and April 2007, Menkhoff and Rungruxsirivorn (2011) find that 9.6% of households were credit-constrained, meaning that they had either applied for a loan and been rejected or were not able to obtain the full amount of credit that they requested. These authors estimate that the establishment of the Village Fund reduced the proportion of credit-constrained households by about 3 percentage points.

The 2013 round of the Thailand Socioeconomic Survey asked respondents whether they could borrow money for operating a business or farm; 63% of respondents said they could, 22% said they could but chose not to, 10% said they could borrow some of what they wanted, and 5% said they could not borrow at all (Table 3.8). While at first glance, these data would appear to provide clear evidence of credit rationing, the results are in fact more difficult to interpret. Table 3.8 shows that among respondents who said they could not borrow for the business of agriculture, half did actually have debt and almost one-third had "agricultural debt," meaning that they had borrowed for an agricultural purpose. The levels and sources of income and assets of "can't borrow" households were relatively similar to those of households that either would not borrow or could only borrow part of what they wanted. Thus, without more detailed information, it is difficult to tell whether those who would like to borrow more are truly credit-constrained by the financial system or whether they have simply reached the limit of what a lender would reasonably choose to lend.

Table 3.8: Characteristics of Farmers Who Can and Cannot Borrow More for Business Purposes in 2013

	Can or would the household borrow for business or agriculture?			
	Yes	Won't	Partially	No
Has debt (%)	86.6	31.3	79.8	52.2
Amount of debt (baht)	175,508	57,070	122,768	84,380
Has agricultural debt (%)	57.4	12.7	48.2	32.1
Amount of agricultural debt (baht)	65,667	13,000	53,557	32,649
Farm income (baht)	9,834	7,037	5,918	9,052
Nonfarm income (baht)	9,325	7,801	7,572	7,249
Remittances received (baht)	20,848	19,068	18,852	14,080
Interest earned (baht)	1,014	1,056	2,142	941
Land owned (rai)	19.6	12.8	14.9	13.7
Observations	9,471	3,413	1,653	783
% of total	63.0	22.0	10.1	4.8

Source: Socioeconomic Survey 2013.

Over 30 years ago, Siamwalla et al. (1990) undertook a survey of lenders and borrowers in Nakhon Ratchasima province in Thailand's northeast region. At the time, only about half of farm credit came from formal institutions, and informal lenders were "very thick on the ground" (Siamwalla et al. 1990: 277). However, the authors observe that a typical villager, although they had access to between three and five informal lenders, usually borrowed from only one informal lender and maintained a relationship with that lender over many years, despite relatively high interest rates. Siamwalla et al. argue that "funds are not the constraining factor" (p. 290)—meaning that there was no rationing in the Stiglitz-Weiss sense—but that informal lenders had some monopoly power: the high cost involved in acquiring information about a borrower's creditworthiness served as a barrier to entry.

Yet by 2013, only 3% of farm credit came from informal lenders. How did this transformation occur?

3.4.2 The Players

The state-owned Bank for Agriculture and Agricultural Cooperatives, founded in 1966, is the dominant source of agricultural credit in Thailand, as mentioned previously (BAAC 2016). BAAC began modestly but expanded rapidly in the 1970s when the government ordered all banks to either lend 5% of their portfolio to the agricultural sector or deposit that amount with BAAC, which in turn would channel the funds to farmers and cooperatives (Limsombunchai 2006; Siamwalla et al. 1990).

BAAC established an innovative model of group lending, under which farmers can borrow without collateral if they form themselves into groups of at least 5 (and typically 12–15) borrowers. Each borrower may borrow a different amount, and loans are made to individuals, but the group as a whole is responsible for the repayment of all the loans undertaken by its members (Lightfoot n.d.). The groups must pay a higher interest rate for overdue loans, and no member may borrow further from BAAC until repayment has been made in full. This mechanism creates group responsibility and in principle the effect ensures peer monitoring, which helps solve the information problem often inherent in lending. On the other hand, as noted earlier, recent research suggests that this model is no longer working particularly well.

This change helps explain why BAAC increasingly lends to cooperatives and to individuals against collateral, and why it has begun to lend more extensively to the nonagricultural sector. Over time, BAAC has been able to displace informal lenders; Siamwalla (1988) attributes this to the institutional innovation of its joint-lending model rather than to government efforts to support BAAC. In the early decades of its existence, BAAC relied on government subsidies, but it has since become effective at raising deposits—a total of B1.7 trillion as of October 2022, compared to B1.6 trillion in loans—and providing a full range of banking services through its network of almost 1,000 branches.

BAAC has established a structure of interest rates that reward good behavior but that also reflect the average cost of funds. As of March 2016, new farmers can borrow at a rate of 9.25%. With timely repayment, this rate falls to 8.5% after two years, to 7.75% after three years, and to 7% after four years of on-time loan service. On the other hand, overdue loans face an interest rate of 10%.

BAAC field officers are allowed some discretion in how they handle clients; when farmers face shocks, such as drought or even illness, the bank may allow them to delay repayment or may lower the interest rate charged. Townsend and Yaron (2001) refer to this as "risk-contingency" lending. Based on information gathered from 960 households in the center of Thailand between May 1997 and 2001, Alem and Townsend (2012) find that the consumption spending of BAAC borrowers is not sensitive to income shocks and argue that BAAC's procedures embed an implicit insurance option, so "farmers clearly receive an indemnity." These authors do not find an equivalent effect for other sources of borrowing.

The other major financial actor in rural Thailand is the Thailand Village and Urban Community Fund (TVF or "Village Fund") program, which was established in 2001 with the aim of providing a million baht (about $22,500 at the then-prevailing exchange rate) to every village and urban community in Thailand as working capital for locally run, rotating credit associations. Thailand has almost 74,000 villages and over 4,500 urban communities, so the total injection of capital into the economy envisaged by the "million baht fund" amounted to B78 billion, equivalent to about $1.75 billion, or 1.4% of 2002 GDP.

The Village Fund quickly became the largest microcredit scheme in the world. Under the program, locally elected committees vet loan applications and extend modest loans for terms that rarely exceed one year but that carry relatively low annual interest rates, typically around 6%. In 2013, 29% of agricultural households borrowed from the Village Fund, confounding its early critics who thought that the original injection of funds would gradually be squandered. On the other hand, the Village Fund loans are not especially dynamic (Haughton, Khandker, and Rukumnuaykit 2014); to lend more, the Fund would either have to mobilize deposits or borrow from BAAC, which would in turn create financial liabilities that the management committees may be unwilling to assume. In the following sections, we will address the issue of whether the Village Fund has had a significant impact on farm incomes, spending, or assets.

As noted previously, other sources of agricultural credit are relatively unimportant compared to BAAC and the Village Fund. Commercial banks extend relatively large loans to rural businesses, and credit cooperatives remain active in some areas. Informal lenders, whether family members or village moneylenders or shopkeepers, have been essentially squeezed out, suggesting that very few households need to turn to these "last resort" lenders. Hire purchase arrangements are increasing in popularity.

Sustainability. BAAC, a state-owned institution, was established in 1966 as an agricultural development bank, while the Village Fund was established by the government in 2001. Thus, it is reasonable to ask to what extent these operations could be sustained without government support.

Bank for Agriculture and Agricultural Cooperatives. Initially, most of BAAC's funds came from the government in the form of grants ("shareholder equity"), which the institution then lent to farmers for agricultural purposes. In the late 1970s, the government passed a law requiring commercial banks to devote at least 5% of their lending to farmers or to channel those funds to BAAC, which many did. For the majority of the 1980s, almost two-fifths of BAAC's funding came from commercial bank sources (see Table 3.9); another one-third came from borrowing, much of it from overseas lenders. By about 1990, however, it had become clear that if the bank were to remain relevant, it would need to find other funding sources. It had also become apparent by this time that farmers were keen to save. In this context, BAAC began to promote deposits, especially through the design and promotion of highly popular savings instruments. As a result, BAAC experienced a remarkable expansion in its deposit base, which rose from just 12% of its liabilities in 1980 to 62% in 1998 and 83% in 2003. The number of savings accounts grew from 4.1 million in 1994 to 9.5 million in 2002, representing 2,000 new accounts every day for eight years.

Table 3.9: Sources of Funds for the Bank for Agriculture and Agricultural Cooperatives (%)

	1967	1973	1980	1987	1998	2003
Deposits from public	11	17	12	25	62	83
Mandatory deposits from banks	0	0	39	39	1	0
Borrowing	19	22	35	29	25	5
Shareholder equity	66	57	12	6	7	8
Other liabilities	4	4	2	1	5	4
Total	**100**	**100**	**100**	**100**	**100**	**100**
Deposit/loan ratio	14	19	21	38	83	100

Source: Haberberger (2009), Table 4.1.

This massive expansion of deposits—nine tenths of which are in savings accounts and so are relatively stable—has also allowed BAAC to reduce its dependence on borrowing; this proved to be critical, as the sharp devaluation of the baht during the financial crisis that began in 1997 raised the servicing costs of BAAC's foreign loans and wiped out half of its equity (Haberberger 2009).

In October 1998, BAAC came under the prudential regulation of the Bank of Thailand, which strengthened the institution's ability to bargain with the government and allowed the latter to only undertake "interventions against compensations." Prior to 1998, BAAC had been under the control of the Ministry of Agriculture and Cooperatives and was at times required to subsidize or excuse loans without compensation. A report by the Thai Development Research Institute in 1996 was highly critical of the provision of subsidized loans, arguing that such loans mainly benefited better-off farmers and created moral hazard as farmers felt less obligated to repay government-subsidized loans.

BAAC's new model was put to the test in 2001, when the government ordered BAAC to offer farmers the option of suspending their loan payments for three years. Half of eligible farmers, accounting for 21% of BAAC's loan portfolio, opted for this debt relief; however, BAAC convinced the government to pay for the lost interest. BAAC also refused to lend more to farmers who opted for the three years of debt relief and issued privilege cards to farmers who continued to service their loans.

A good measure of the importance of external support is the **subsidy dependence index**, which measures the proportion by which the lending interest rate would need to rise in the absence of subsidies. The main subsidies provided to BAAC constituted public funds in the form of the institution's own reinvested profits, access to concessional loans, and a lower reserve requirement (which freed up funds for lending). Table 3.10 shows that in the absence of subsidies, BAAC would have had to charge interest rates between 25% and 31% higher (e.g., 10% instead of 8%) in the years prior to the 1997 financial crisis. By 2004, the subsidies had vanished, and for practical purposes, BAAC has not been subsidized for the past decade. The main reason for this shift is that BAAC has increasingly been able to mobilize deposits that it then lends. In addition, after 1993, the bank was able to lend to farmers for nonagricultural purposes; after 1999, it was permitted (within limits) to lend to nonfarmers.

Without subsidies, the bank would have made a −16% return on equity in the mid-1990s, but by 2004 this return had reached 3.4%, comparable to the cost of government borrowing at the time (Table 3.10).

Table 3.10: Dependence on Subsidies and Return on Equity for the Bank for Agriculture and Agricultural Cooperatives

	1995	1996	1999	2000	2004	2005
Subsidy dependence index	30.9	25.4	7.2	4.2	−0.8	1.7
Subsidy-adjusted return on equity	−16.8	−16.0	−1.5	1.7	3.4	2.3

Source: Suwan (2007).

Village Funds. When the government established the Village Fund in 2001, many observers believed that elected village committees would lack the ability to manage the process of lending and would squander the funds. These fears have, in most cases, been unfounded; in addition, neither the proportion of farmers borrowing from the Village Fund nor the average size of loans have fallen over time (Table 3.4). Thus, the Village Fund model has proved to be remarkably durable, despite the fact that the government did not provide any further funds after 2001.

Yet the Village Funds may not be sustainable over the long term. Haughton, Khandker, and Rukumnuaykit (2014) estimate that the full cost of funds in 2009 was about 10.2% of the value of loans, while income (mainly interest and fees) came to 6.6% of loans. This gap (3.6%) was less than the assumed opportunity cost of funds (4.0%), meaning that on average, the Village Funds had a net cash inflow of 0.4% of the amount lent. This explains how the funds have remained intact over the years. Most Village Fund Committees see themselves as "stewards of state-provided funds" and do not have the incentive to expand their operations beyond this role. Over the long term, inflation has eroded the real value of Village Fund capital, and the institution is gradually becoming less relevant.

However, the fact that Village Funds are not ultimately sustainable does not mean that they should not have been introduced. Haughton, Khandker, and Rukumnuaykit (2014) argue that the Village Fund likely had enough impact for its economic benefits to outweigh its costs, and that the Fund has disproportionately helped poorer households.

3.5 The Role of Government

There has been a clear evolution in the attitude of the Thai government toward the agricultural sector over the past 40 years, from one of "spend and tax" to one of "spend and subsidize." The government has consistently supported spending to increase agricultural efficiency, such as investment in roads and irrigation; however, it is only over the past decade that agricultural taxation has declined and given way to more direct support for farmers. In this section, we explore these themes in more detail.

3.5.1 Productive Investment

For fiscal year 2017 (which ended in September 2017), the budget for the Ministry of Agriculture and Cooperatives was B88 billion ($2.6 billion), of which B47 billion ($1.4 billion) was earmarked for the Royal Irrigation Department (Bureau of the Budget 2017). Thailand has long invested in water control, and the irrigated area has risen from 1.7 million hectares (15% of cultivated area) in 1970 to 5.0 million hectares (30% of cultivated area) in 2000. Irrigation is particularly widespread in the central plain, where 60% of the land is irrigated, while it is rare in the northeast, covering just 13% of arable area there. Based on data for 1977–1999, Fan, Jitsuchon, and Methakunnavut (2004) and Fan, Yu, and Jitsuchon (2008) argue that this investment in irrigation has been fairly profitable, with a benefit–cost ratio of 1.7. In addition, farmers pay minimal fees for water and do not come close to covering the cost of provision (Perret, Jourdain, and Saringkarn 2012).

Several other government investments have also proven very helpful to farmers. These include the expansion of education, which helped increase the rural literacy rate from 78% in 1977 to 92% by 2000; electrification, which increased rural electricity consumption 35-fold between 1997 and 2000; and the expansion of the rural road network, mostly paved, from 6,258 kilometers in 1977 to 67,138 kilometers in 2000. Table 3.11 shows the details of these programs.

The government also provides support for agricultural research, particularly for crops. By the late 1990s, three-fifths of the approximately $200 million in annual government spending on research and development went to agriculture. In addition, substantial spending went to agricultural extension services, reaching B6.0 billion ($175 million) in fiscal year 2017. These investments are modest, however, when compared to the country's total GDP of $395 billion in 2015.

Table 3.11: Evidence of Government Investments in Rural Areas, Thailand

	1970	1977	2000
Area irrigated (million hectares)	1.68	...	5.00
Rural electricity consumption (bn kWh)	...	0.94	32.96
Literacy rate, rural areas (%)	...	77.5	91.3
Years of schooling, adults, rural areas	...	3.7	5.9
Rural roads (km)	...	6,258	67,138

bn = billion, km = kilometer, kWh = kilowatt-hour.

Source: Fan et al. (2004).

Using data at the regional level in Thailand for 1977–1999, Fan, Jitsuchon, and Methakunnavut (2004) try to measure the impact of different types of government spending on agricultural productivity and rural poverty. They find that additional spending on agricultural research has the largest impact on increased agricultural productivity, as well as a substantial effect on poverty reduction. Spending on electrification, and to a lesser extent on education and irrigation, have also raised productivity and reduced poverty. However, these authors find that government investments in roads have had little discernible effect on either agricultural productivity or rural poverty. The case for continued investment in agricultural research, given its public goods nature—expensive to undertake, but cheap to disseminate—is strong. On the other hand, almost every village in Thailand now has access to electricity, so there is little scope for further gains in that area.

3.5.2 Taxes and Subsidies

Until about 2000, the Thai government taxed agriculture, particularly rice, indirectly but heavily (Table 3.12). One measure of this taxation is the nominal rate of assistance, which measures the extent to which value added is protected (a positive value) or taxed (a negative value). As recently as the early 1970s, the nominal rate of assistance in agriculture was –23%, compared to +16% for industry. These rates were mainly due to high taxes on exports of rice and cassava and tariffs on imports of industrial goods. Thus, the domestic price of rice was just 53% of the border price in 1970–1974. This approach to taxation reflected the thinking of the time, which was that agriculture needed to be taxed in order to finance the development of industry.

Table 3.12: Measures of Protection for Agriculture

	1970–1974	1990–1994	2000–2004	2006–2010
Rice: Domestic price/border price	53.4	81.6	91.1	...
Nominal Rate of Assistance:				
Agricultural tradables	–23.1	–6.4	–0.2	3.2
Nonagricultural tradables	16.1	10.0	7.8	7.5
	1975	**1990**	**2000**	
Value added/Output (%)	78.4	67.2	62.9	

Source: Warr and Kohpaiboon (2007). https://catalog.ihsn.org/index.php/catalog/3611 (accessed 12 February 2024).

By 1990, the tax burden on agriculture had eased somewhat; the nominal rate of assistance was –6%, and the domestic price of rice had risen to 82% of the world level. The bias against agriculture had disappeared by 2000–2004, and by 2006–2010, there was even a modest tilt in favor of agriculture. Over time, Thailand's industrial and service sectors have become well-established, while the share of agriculture in GDP has fallen, undermining any case that might be made for continuing to tax agriculture to subsidize the rest of the economy.

Indeed, after 2011, the pendulum swung heavily in favor of subsidizing rice farmers, with a dramatic expansion of the government's rice pledging program. This scheme was originally introduced during the period of the fourth development plan (1977–1981) and was extended to other crops during the ninth plan (2002–2006). The program aimed to provide a mechanism under which farmers would not be obliged to sell their rice immediately after the harvest, when prices would potentially be low. Rather, the government sets a price at which it will buy rice from farmers well after the harvest, usually at a level that is close to the expected market price; the farmer pledges the rice by bringing it for storage to a public warehouse but is free to withdraw and sell the rice to any other buyer if the price moves above the government benchmark. Having pledged the rice, the farmer can then get access to credit, typically from BAAC. This scheme thus provides a cash flow for farmers and gives them more bargaining power vis-à-vis traders.

In 2011, the government of Yingluck Shinawatra raised the pledging price of paddy rice to B15,000 ($440) per ton, roughly double the price that prevailed in 2010. This means that after milling, the government would have needed to sell the rice for $830–$870 per ton on the world market, at a time when the world price averaged just $573. Budgetary spending on the rice price scheme reached close to $7 billion in 2012, and by the end of 2013, the government was holding 17.5 million tons of rice in stock, equivalent to about twice the level of typical annual exports. In January 2014, the government defaulted on payments under the scheme, and in May 2014, the prime minister was removed from office and her government was overthrown by the military. The new government scaled back the scheme considerably, so that in 2014–2015, only 80,000 farmers pledged just 450,000 tons of rice—down from over 4 million farmers the previous year—triggering B6.4 billion in loans from BAAC.

The political need to subsidize rice farming has not disappeared. In October 2016, the government responded to low prices for Hom Mali rice—the market price was about B4,500–B7,000 per ton at the time, as world demand for rice fell while supply expanded—by setting a pledging price of B11,525 per ton. Under this "barn program," farmers would store the rice themselves rather than in a public facility; in addition, only one-third of farmers would be eligible for the program, and the subsidy would go mainly to reducing the interest rate paid on the loans extended against the collateral of the pledged rice.

From an efficiency point of view, it makes little sense to subsidize rice production. The claim by the Yingluck government that Thailand has market power in the world market for rice has been shown to be incorrect (Mahathanaseth and Pensupar 2014). However, governments will be obligated to continue to support rice farmers, who constitute an important political force; thus, subsidies in one form or another will likely persist, particularly in periods of low world prices.

In addition to rice, rubber is Thailand's other preeminent export crop. Thailand produces about 35% of the world's natural rubber and is the world's largest rubber exporter, with shipments worth $5.5 billion in 2021. The price of rubber has swung widely over the past decade and a half; the average producer price in Thailand in 2000 was $537/ton, rose steadily to $1,330 in 2005 and $3,250 in 2010, and peaked at $4,067 in 2011, before falling to $1,290 in 2015.

Farmers responded to the favorable prices by expanding production, from 2.2 million tons in 2000 to 3.3 million in 2010 and 4.5 million in 2015 (FAO 2017). Floods in late 2016 led to fears of a poor harvest and to a short price spike in early 2017. By June 2017, however, the price of rubber had returned to sufficiently low levels, leading the government to renew its subsidy for small rubber farmers—payments of B1,500 per rai, up to a maximum of 15 rai—and to approve an additional B10 billion in loans to rubber cooperatives. In the 12 months ending in March 2016, the government paid B9.3 billion ($273 million) to 1.2 million rubber farmers and tappers in order to buffer the shock of lower prices, as well as a further B10.8 billion ($317 million) to help populations dependent on rubber farming find employment in other sectors.

These trends show the government's pattern, which has become increasingly well established, of stepping in to help farmers during periods of stress.

3.5.3 Loan Moratoria

One of the largest government support programs is the debt moratorium scheme (Ratanavararak and Chantarat 2022). First introduced in 2001, when many farm loan repayments were suspended (but not forgiven) for three years, it was revived in 2011 and has been used increasingly often since then to alleviate farmers' liquidity constraints in response to disasters or to COVID-19. Debt moratoria mainly apply to BAAC loans and are now applied automatically for eligible borrowers. Using an eight-year panel (2014–2021) of a million farmer borrowers from BAAC, matched with farm and farmer characteristics from the Farmer Registration database, Ratanavararak and Chantarat find that farmers' debt has been growing by 17.6% per year, and they owed an average of B346,000 ($10,000) to BAAC in 2021. In that year, there were 121 different debt-related government support programs applicable to BAAC's sample of borrowers. Over the eight years covered by the data, 86% of borrowers benefited at some point from a debt moratorium (including 77% in 2021), which covered 46% of outstanding debt over 14 programs (Ratanavararak and Chantarat 2022: 11). An estimated 41% of borrowers enjoyed a debt moratorium for at least four of the seven years observed in this study. About half of the moratoria were shock-related.

Ratanavararak and Chantarat (2022) estimate models of delinquency, and of debt growth, as a function of participating in a debt moratorium, along with other variables. They find that debt moratorium participation is associated with slightly higher loan growth and a delinquency rate that is lower in the short run (unsurprisingly), but actually is higher in the medium to long term. The authors suggest that debt moratoria should be used more sparingly, or perhaps even changed to narrowly targeted debt forgiveness or to credit insurance that is linked to clearly measurable criteria.

3.5.4 Insurance

Government efforts to support rubber or rice farmers, particularly when prices are low or when disasters triggered by natural hazards strike, represent a form of insurance. Efforts to provide formal crop insurance have, until recently, not been particularly successful. A scheme to insure cotton farmers against disasters was introduced in 1978, and indemnity insurance for all risks for growers of maize, sorghum, and soybeans was put in place in 1990; however, these efforts lost money and covered few farmers (Win 2016). With World Bank support, a pilot project of weather-index insurance for maize growers was started in 2007 but had only reached 3,182 farmers by 2010. A similar pilot program for rice farmers was supported by the Japan Bank for International Cooperation in one province in the northeast in 2007 and has subsequently been expanded.

In 2014, the government introduced a new national insurance program for rice farmers, covering all disasters triggered by natural hazards. Farmers pay between B60 and B100 per rai, depending on the risk faced by their location, with the government paying between B64 and B383 per rai in subsidies. The payouts can reach B1,111 per rai. In its first year, the program covered 240,000 hectares (out of 10.1 million hectares of total farmland) and was expected to expand rapidly. Such expansion would be needed in order to bring premiums down to a manageable level (Oxford Business Group 2016b). BAAC offers a B10 discount if farmers pay their premiums on time.

This insurance complements the government's disaster relief program, which already compensates farmers whose rice crop has "suffered from calamity" (Jeerahaipaisarn 2012) and pays B1,113 per rai for up to 30 rai per farmer.

The Fiscal Policy Office of the Ministry of Finance has stated that it aims to reduce this payment to B800, while increasing payouts from the insurance program to B1,500, but this transition will require more reliable and widespread uptake of crop insurance.

3.6 Who Borrows?

In 2013, 72% of rural households had contracted debt of some sort (Table 3.4), although not necessarily for agricultural purposes. In this section, we ask why some agricultural households borrow and others do not; for those that borrow, we explore the correlates of that borrowing. The data come from the socioeconomic survey of 2013—the most recent data available to us—and refer only to households that receive at least some income from agriculture.

We estimate two models, one for total debt and the other for "agricultural debt" only. The latter measures the borrowing that households report as being used for agricultural purposes. We use a Heckman two-step procedure, in which we first estimate a probit equation to determine who borrows and then estimate a model of the amount borrowed using a least-squares equation in which we include a measure of the non-selection hazard (the inverse Mills ratio) from the first equation. This helps us correct for sample selection bias in the second stage and the results are statistically significant; thus, this modeling approach is appropriate. We included the variables that measure whether households could or would not borrow in the first, but not second, stage of the model.

Table 3.13 presents the results. Unsurprisingly, households are more likely to incur debt and to borrow more heavily if the head is older or owns more land, albeit at a diminishing rate. Households with better-educated heads are also likely to borrow more, and more often. This is also true of households that get more income from remittances or from nonfarm sources. This model does not address the issue of whether credit is rationed, but the decent fit and plausible nature of the relationships suggest that there is a clear logic to lending to agricultural households.

Table 3.13: Models of Borrowing for All Debt and for Agricultural Debt, Thailand, 2013

	Model 1: All Debt		Model 2: Agricultural Debt		Summary Statistics		
	Has Debt	Amount of Debt	Has Debt	Amount of Debt	Mean	Min	Max
Geographic Effects							
Urban (Yes=1)	−0.105***	0.024	−0.125***	−0.009	0.14	0	1
	−4.23	*1.02*	*−5.41*	*−0.34*			
Region (Bangkok = reference)							
Central	0.200	−0.612	0.747	−0.699	0.12	0	1
	0.35	*−1.24*	*1.49*	*−1.17*			
North	0.241	−0.642	0.897*	−0.734	0.23	0	1
	0.42	*−1.31*	*1.79*	*−1.23*			
Northeast	0.299	−0.936*	0.623	−0.999*	0.51	0	1
	0.53	*−1.91*	*1.24*	*−1.68*			
South	−0.143	−0.157	−0.087	−0.175	0.34	0	1
	−0.25	*−0.32*	*−0.17*	*−0.29*			
Characteristics of Head							
Age of head	0.036***	0.020***	0.035***	0.012	55.1	15	99
	5.32	*2.84*	*5.27*	*1.44*			
Age of head squared ('000)	−0.350***	−0.107*	−.298***	−0.056	319	0.23	9.80
	−5.92	*−1.68*	*−5.02*	*−0.78*			
Head is male? (Yes=1)	−0.066***	−0.006	0.030	−0.019	0.72	0	1
	−2.14	*−0.19*	*1.05*	*−0.56*			
Household head is married	0.177***	0.128***	0.141***	0.115***	0.79	0	1
	5.08	*3.43*	*4.14*	*2.77*			
Head: some/all primary education	0.252***	0.300***	0.187***	0.230***	0.79	0	1
	4.80	*4.81*	*3.44*	*3.40*			
Head: some/all secondary education	0.465***	0.821***	0.188***	0.442***	0.13	0	1
	7.37	*11.69*	*3.00*	*5.79*			
Head: some graduate education	0.751***	1.935***	−0.158	1.122***	0.02	0	1
	7.30	*19.99*	*−1.63*	*8.77*			
Head: Buddhist	0.404***	0.609***	0.270**	0.698***	0.96	0	1
	3.81	*4.76*	*2.54*	*5.15*			
Head: Muslim	0.212*	0.259*	−0.073	0.602***	0.03	0	1
	1.69	*1.70*	*−0.52*	*2.91*			

continued on next page

Table 3.13: ***Continued***

	Model 1: All Debt		Model 2: Agricultural Debt		Summary Statistics		
	Has Debt	Amount of Debt	Has Debt	Amount of Debt	Mean	Min	Max
Household Characteristics							
Dependency (old+young/household)	−0.155***	−0.372***	−0.118***	−0.197***	0.36	0	1
	−3.37	*−7.81*	*−2.66*	*−3.81*			
Size of household	0.120***	0.087***	0.016**	0.038***	3.51	1	23
	13.85	*10.35*	*2.09*	*4.14*			
Would not borrow	−1.489***		−1.280***		0.22	0	1
	−52.79		*−38.50*				
Could not borrow	−0.926***		−0.556***		0.05	0	1
	−18.75		*−10.45*				
Remittances received ('000 baht/year)	0.002***		0.001**		19.9	0	12,000
	5.94		*2.55*				
Interest earned ('000 baht/year)	−0.002**	0.008***	−0.008***	0.009***	1.13	0	780
	−2.06	*6.86*	*−3.90*	*3.38*			
Nonfarm income ('000 baht/year)	0.001**	0.005***	0.002***	0.002***	8.71	−1,463	1,738
	2.44	*11.93*	*−5.01*	*2.87*			
Characteristics of Farm							
Land area farmed (rai)	0.011***	0.022***	0.023***	0.020***	17.33	0	400
	11.37	*25.90*	*26.46*	*18.23*			
Land area squared ('00 rai)	−0.003***	−0.005***	−.006***	−0.004***	7.65	0	1,600
	−8.26	*−13.29*	*−16.14*	*−10.81*			
Intercept	−1.340**	9.533***	−2.410***	9.908***			
	−2.21	*17.43*	*−4.44*	*14.96*			
Inverse Mills ratio (non-selection hazard)	−0.225***		−0.195***				
	−4.82		*−3.31*				
Number of observations	15,320	10,611	15,320	6,594			
Mean value dependent variable (not logs)	0.721	139,694	0.454	51,253			
Pseudo R2	0.26		0.21				

Notes: Sample is confined to households with at least some agricultural income. Amount of debt: Log of the amount of debt (in baht) owed by the household. Asterisks denote statistical significance at the 10% (*), 1% (**), and 0.1% (***) levels.

Source: Based on Socioeconomic Survey 2013.

3.7 How Important Is Credit to Farmers?

All dynamic farm systems use credit, so it is broadly indisputable that there is a strong demand for agricultural credit and that farmers view such credit as useful. Could institutional or financial innovations help loosen any remaining credit rationing or make credit more efficient or affordable?

In this section, we examine two cases that are treated in more detail in Boonperm et al. (2013). The first, a natural experiment in microcredit provision, occurred when the Village Fund was established in 2002, providing both a new mechanism for providing credit in the form of village-level rotating credit associations and a large injection of loanable funds. The second case concerns BAAC, which has consolidated its position as the major lender to farmers and which is useful to examine in terms of its contribution to farm incomes and spending.

3.7.1 The Village Fund

We first examine whether the Village Fund has had an impact on household incomes and spending, as well as the magnitude of those effects.

Even without the Village Fund, Thai households have considerable access to credit, as we have documented in previous sections. In a 1997 survey of 1,875 households in 192 villages in four provinces in central and northeastern Thailand, Kaboski and Townsend (2005, 2011) find that loans from BAAC—widely considered to be a successful rural finance institution (Yaron 1992, Fitchett 1999)—were available in 87% of villages; furthermore, three-fifths of villages had at least one local financial institution (such as a rice bank or a women's lending group). Using data from 1,575 households in three provinces in northeastern Thailand, surveyed in 2007 and 2008, Kislat and Menkhoff (2012) report that the main sources of village credit, as measured by the volume of lending, were BAAC (40%), the Village Fund (24%), credit and savings groups and local cooperatives (17%), money lenders (7%), relatives (6%), and other sources, including commercial banks and policy funds (6%).

Although Thai households would seem to have broad access to credit, credit markets have well-known informational asymmetries that in turn can lead to the inefficient allocation of credit, excessive loan default, monopoly profits for well-informed lenders, and even credit market collapse (Bardhan and Udry 1999).

These asymmetries may leave a role for microcredit. In Thailand, Coleman (2006) finds no evidence that microloans had any impact on incomes or spending; his study was based on a sample of 445 households in northeastern Thailand, surveyed in 1995–1996, in villages where two Thai nongovernment organizations provided six-month loans averaging B2,000 (about $60) apiece.

The availability of other sources of credit can explain why, according to the nationally representative Thailand Socioeconomic Survey undertaken in 2004, 24% of respondent households said that they did not borrow from the Village Fund because they had no need for credit. A further 25% of households said that they did not borrow from the Village Fund because they did not want to take on more debt.

We are interested in measuring the impact of the Village Fund on expenditure per capita, durable goods accumulation, and income per capita. The data come from the Thailand Socioeconomic Surveys of 2002 and 2004. The 2004 survey interviewed 34,843 households (covering 116,444 people) throughout the country, drawn from 2,044 municipal "blocks" and 1,596 villages in 808 districts. An important feature of these two surveys is that they include a panel of 5,755 rural households. An effort was made in 2004 to resurvey all 6,309 households that had been surveyed in rural areas in rounds 2 and 3 of the 2002 Thailand Socioeconomic Survey. The timing of this panel is important, because these households were surveyed at the very moment that the Village Fund was rapidly expanding; after 2004, the Fund's coverage stagnated, making it harder to determine its impact on households.

Formally, let y_{it} be the outcome variable of interest—for instance, income per capita—for adult i in time t (t = 2002, 2004), x_{it} be a set of regressors, and T_{it} be a measure of the "treatment," here defined as borrowing from the Village Fund. We may then specify an individual-specific-effects model of the form

$$y_{it} = \alpha_i + x'_{it}\beta + T_{it}\gamma + \varepsilon_{it}.$$

A fixed-effects model sets a separate intercept (α_i) for each household, and these intercepts can pick up much of the (unobserved) heterogeneity across households. Differencing gives

$$y_{i,2004} - y_{i,2002} = (\mathrm{x}_{i,2004} - \mathrm{x}_{i,2002})'\beta + (T_{i,2004} - T_{i,2002})\gamma + (\varepsilon_{i,2004} - \varepsilon_{i,2002}). \quad (1)$$

This is the first model that we estimate, and it generates "within" estimates that are identified by variation over time in terms of whether a household borrows from the Village Fund.

Over the two years, 2002 and 2004, 42.5% of households did not borrow from the Village Fund, while 30.9% borrowed in both years. However, 6.7% borrowed in 2002 but not 2004, and 19.9% borrowed in 2004 but not 2002. This is relevant because the identification of the effects of Village Fund borrowing in equation (1) comes from households that changed their Village Fund borrowing habits between the two years—if $(T_{i,2004} - T_{i,2002}) = 0$, then we cannot estimate the impact, γ—and the observation that more than one in four households did change their behavior adds to the credibility of the estimates. The effects are also assumed to be symmetric, meaning that taking up a loan has the same impact as dropping a loan.

It is possible that the fixed-effects/differenced model eliminates any relevant selection bias if the bias is due to time-invariant heterogeneity, but we cannot test this directly; if the unobserved heterogeneity varies over time, the fixed effects estimates are inconsistent. To identify whether this is the case, an alternative strategy is to seek one or more instruments for ΔT_i (i.e., the change in whether one borrows from the Village Fund) that would come close to mimicking a random assignment of treatment so that any bias due to time-varying heterogeneity is controlled. In this view, ΔT_i is a "troublesome explanatory" (Murray 2006) that risks being correlated with the error term in (1). With the use of instruments, the model becomes

$$\begin{aligned} \Delta y_i &= \Delta x_i' \beta + \Delta T_i \gamma + \Delta \varepsilon_i \\ \Delta T_i &= \Delta x_i' \pi_1 + z_i' \pi_2 + \nu_i. \end{aligned} \tag{2}$$

For valid instruments z, we need $\mathrm{cov}(z_i, \Delta\varepsilon_i)=0$, and for the instruments to be relevant, they need to be solidly correlated with the treatment variable.

The instrument that we use is based on the observation that every village, regardless of size, was provided with an initial million baht in funds. Thus, one would expect that households would have more difficulty obtaining a loan if they live in a large village than a small one: indeed, by 2004, 61% of households in small villages (defined as those with fewer than 100 households) had borrowed from the Village Fund, compared to 29% of households in large villages (defined as those with 200 or more households). Thus, village size, measured here by the inverse

of the number of households, should be correlated with treatment (instrumental relevance) but not with $\Delta\varepsilon_i$ (instrumental validity). Because we only have this measure for 2004, it is time invariant; thus, we take the now-standard approach of interacting this measure with a variety of household variables (see Pitt and Khandker [1998] for an early and important example); the notes below Table 3.14 provide the details.

In Table 3.14, we show the results for two equations: one measuring the effect on the log of expenditure per capita and the other measuring the effect on the log of income per capita. The other regressors include a variety of household variables that include age and gender, as well as dummies for all of the relevant provinces (of which there are 76 in Thailand). The standard errors adjust for village-level clustering.

We find that borrowing from the Village Fund raised expenditure per capita by 3.5%, an effect that is statistically significant at the 5% level. The measured effect of Village Fund borrowing on income per capita is 1.4%, but this is not statistically significant. Table 3.14 also shows the results of the instrumental variables estimation; the tests suggest that there is no real need to use instruments, in which case the more straightforward differenced equation results are more defensible.

Table 3.14: Estimates of the Effects of Village Fund Borrowing Using Rural Panel Data for 2002 and 2004

	Expenditure per Capita		Income per Capita	
	2002	2004	2002	2004
Panel Data Sample Statistics	**Means, baht/month, 2004 prices**			
Whole panel data sample	2,370	2,560	3,128	3,257
Borrow from VF in 2002 only	2,333	2,612	2,739	3,118
Borrow from VF in 2004 only	2,300	2,471	3,203	3,178
Borrow from VF in both 2002 and 2004	2,204	2,307	2,816	3,003
Borrow from VF in neither 2002 nor 2004	2,529	2,778	3,381	3,500
	Impacts			
Differenced Equation*				
Impact	**0.035***		**0.014**	
Standard error / p-value	0.015 / 0.024		0.018 / 0.436	

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Table 3.14: ***Continued***

	Expenditure per Capita		Income per Capita	
	2002	2004	2002	2004
Differenced Equation, GMM, IV ("inverse village size")				
Impact	**0.141***		**0.114**	
Standard error (bootstrapped, n=50) / p-value	0.064 / 0.028		0.078 / 0.144	
Tests of Instruments:				
GMM C Statistic, $\chi^2(1)$ / p-value	2.991 / 0.084		1.707 / 0.191	
Hansen's J, $\chi^2(7)$ / p-value	2.752 / 0.839		1.638 / 0.950	
F(8, 674) for first-stage instruments / p-value	33.53 / 0.000			
Minimum eigenvalue statistic / 5% critical value	67.79 / 19.86			

GMM = generalized method of moments, VF = Village Fund.

Notes:

1. The dependent variable is the natural log of expenditure (or income) per capita. All estimates adjust for clustering by primary sampling unit ("village").
2. Other independent variables: Age, education, gender of head of household; number of adult, women; number of men, women, working in agriculture, industry, trading, services; one-adult, two-parent, one-parent households; number of earners in household; whether head is self-employed, an employee, or otherwise occupied.
3. Instruments: Village fund operates in village; "no need" case also includes no need for loan interacted with education of head, number of adult men, women; age of head; number of men, women, working in agricultural sector. "Inverse village size" case also includes inverse of number of households in the village interacted with the same other variables (i.e., education of head, etc.).

Asterisks denote statistical significance at the 10% (*), 1% (**), and 0.1% (***) levels.

Source: Based on (rural) panel from Thailand Socioeconomic Surveys of 2002 and 2004. The panel has observations on 5,054 households.

3.7.2 Bank for Agriculture and Agricultural Cooperatives

The single most important lender in most areas of Thailand, as previously mentioned, is BAAC. The data from the rural panel for 2002 and 2004 show that 54.7% of households borrowed from BAAC in one or both of these years: 27.9% borrowed in both years, 6.0% borrowed in 2002 only, and 20.7% borrowed in 2004 only. Although we do not have survey information on the amounts that households borrowed from BAAC—and this is likely to vary far more widely than the amounts of Village Fund loans—we are able to estimate the impact of BAAC borrowing using an approach similar to that applied to Village Fund loans.

We show our results in Table 3.15. Using a difference (i.e., fixed effects) equation, with adjustments to the standard errors to reflect sample design, we estimate that BAAC loans boost income per capita by a statistically significant 5.7%; the effect on expenditures is 1.7%, but this is not statistically significant. These findings contrast with the Village Fund results, in that BAAC credit appears to be channeled into boosting income and perhaps stabilizing consumption (Kaboski and Townsend 2011), while Village Fund credit is employed more to raise consumption. There is no reason to expect that BAAC lending is related to village size; thus, we do not try to instrument BAAC lending (as we did with Village Fund lending).

Table 3.15: Estimates of the Effects of Borrowing from the Bank for Agriculture and Agricultural Cooperatives, Using Rural Panel Data for 2002 and 2004

	Expenditure per Capita		Income per Capita	
	2002	2004	2002	2004
Panel Data Sample Statistics	**Means, baht/month, 2004 prices**			
Whole panel data sample	2,370	2,560	3,128	3,257
Borrow from BAAC in 2002 only	2,183	2,317	3,015	2,797
Borrow from BAAC in 2004 only	2,117	2,283	2,667	2,918
Borrow from BAAC in both 2002 and 2004	2,088	2,219	2,746	2,923
Borrow from BAAC in neither 2002 nor 2004	2,542	2,766	3,364	3,505
	Impacts			
Differenced Equation*				
Impact	0.017		0.057*	
Standard error / p-value	0.018 / 0.341		0.021 / 0.006	

BAAC = Bank for Agriculture and Agricultural Cooperatives.

Notes:

1. The dependent variable is the natural log of expenditure (or income) per capita. All estimates adjust for clustering by primary sampling unit ("village").
2. Other independent variables: Age, education, gender of head of household; number of adult, women; number of men, women, working in agriculture, industry, trading, services; one-adult, two-parent, one-parent households; number of earners in household; whether head is self-employed, an employee, or otherwise occupied.

Asterisks denote statistical significance at the 10% (*), 1% (**), and 0.1% (***) levels.

Source: Based on (rural) panel from Thailand Socioeconomic Surveys of 2002 and 2004. The panel has observations on 5,054 households.

3.7.3 Complementary Lending: Village Fund and Bank for Agriculture and Agricultural Cooperatives

There is some evidence of synergies between Village Fund and BAAC borrowing. Using propensity score matching with the 2004 data, we find that borrowing from BAAC (but not the Village Fund) is associated with a 3.6% increase in expenditure per capita (t = 1.63); for borrowing from the Village Fund (but not BAAC), this effect is 2.1% (t = 1.67), while for households that borrow from both sources, the effect is 9.1% (t = 5.80).

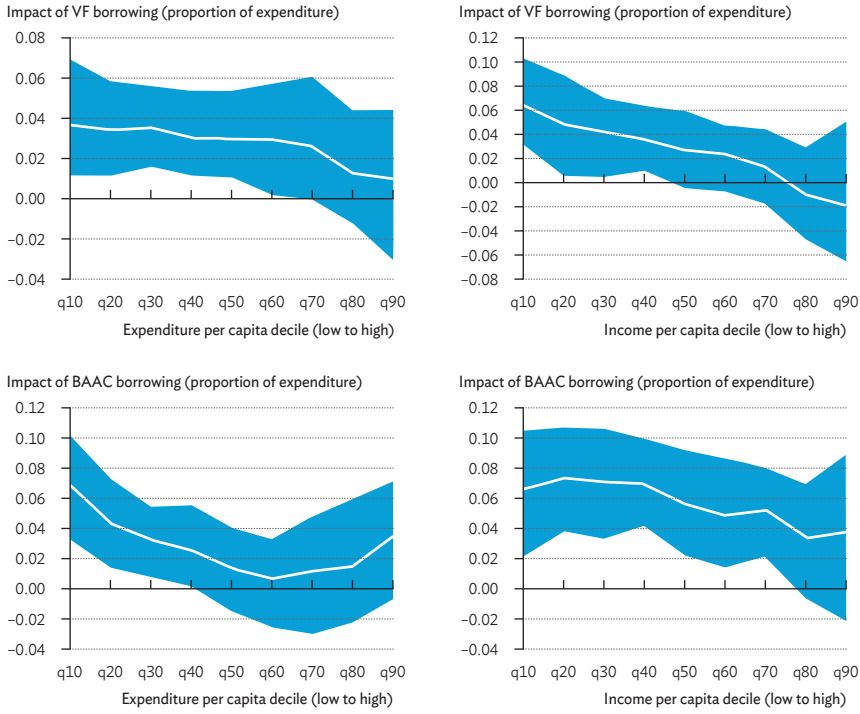
It is likely that the effects of borrowing from the Village Fund or BAAC vary according to whether a household is poor or affluent. One way to explore such effects is with quantile regressions; we present the results of a series of such regressions in Figure 3.4. The estimates that underlie these graphs are based on the rural panel data for 2002 and 2004 and use a procedure proposed by Gamper-Rabindran, Khan, and Timmins (2010). First, we estimate quantile regressions for each quantile step θ (e.g., 10%, 20%), for 2002 and for 2004 separately, being sure to include covariates from *both* years. Second, we regress the differenced fitted values from the quantile regressions as follows:

$$\hat{y}^{\theta}_{i,2004} - \hat{y}^{\theta}_{i,2002} = (\mathrm{x}_{i,2004} - \mathrm{x}_{i,2002})'\beta^{\theta} + (T_{i,2004} - T_{i,2002})\gamma^{\theta} + (\varepsilon^{\theta}_{i,2004} - \varepsilon^{\theta}_{i,2002}). \quad (3)$$

Here, for instance, $\hat{y}^{\theta}_{i,2004}$ refers to the fitted values of the quantile regression for a given value of θ for 2004.

The estimates of γ^{θ} for the 10th through 90th deciles are shown in Figure 3.4 (top left), along with the associated 95% confidence interval, based on bootstrapped standard errors. The results show that the relative impact of Village Fund borrowing on per capita spending is strongest at the lower quantiles, where the effect is close to 4%, compared to the average effect based on the panel data of 3.5%, and diminishes to about one-third of this level in the top two deciles. The top right panel in Figure 3.4 shows a similar graph for the quantile regressions for per capita income (rather than expenditure); this shows, quite strikingly, strong effects for the lower quintile regressions and small or insignificant effects at higher quintiles. The average Village Fund loan is slightly higher for households in the poorest quintile than for those in the richest (B17,312 vs. B16,749), but the difference is not large enough to explain the pattern shown in the graphs.

Figure 3.4: Quantile Regression Estimates of Impact on Expenditure and Income of Borrowing from Village Fund Borrowing and Bank for Agriculture and Agricultural Cooperatives, 2002–2004



BAAC = Bank for Agriculture and Agricultural Cooperatives, VF = village fund.

A more plausible interpretation is that many low-income households reported borrowing from the Village Fund for income-enhancing purposes, while those at the upper end of the distribution reported borrowing more for consumption than for production.

The bottom left panel of Figure 3.4 shows the coefficients and 90% confidence intervals for quantile regressions when the treatment is "BAAC borrowing," in which case the dependent variable is the log of expenditure per capita. Here, too, the effects are strongest and most statistically significant at the bottom end of the (rural) expenditure and income distributions.

The Village Fund is pro-poor in two senses: lending appears to have a larger effect on current spending by poor people than by nonpoor people, and the loans are more likely to go to poor households. This latter effect results from the design of the Village Fund. The policy of providing a million baht per village helped smaller villages, which in turn tend to be poorer; the mean income per capita in small villages (with less than 100 households) was B3,723 in 2004, compared to B5,344 in large villages (with 200 households or more). On the other hand, lending by BAAC does not disproportionately favor either poor people or rich people.

3.7.4 COVID-19

Although Thailand reported a case of COVID-19 as early as January 2020, the country did not experience serious numbers of infections until 2021, with a first wave peaking in July–August and a second cresting in March–April 2022 (Worldometers 2023). Nonetheless, the country was affected by the complete collapse of tourist arrivals after March 2020 and disruptions to supply chains both at home and abroad. The result was that GDP fell by 6.1% in 2020, the largest shock in over two decades.

The effects on labor markets were dramatic. According to a rapid phone survey of about 2,000 adults undertaken for the World Bank in mid-2021, 42% of workers lost a job or business, 49% temporarily stopped working, 53% worked fewer hours, and 59% got lower pay in the period after March 2020, compared to the previous period (World Bank 2022). Between March 2020 and June 2021, the urban employment rate—i.e., employment as a percent of the adult population—fell from 73% to 65%, while it rose from 64% to 74% in rural areas. The accompanying large, if temporary, return migration raised the share of workers in agriculture from 13% in March 2020 to 22% by June 2021. Many of those who returned had been working in the hospitality and construction sectors in the cities, two sectors that were especially hard hit.

The World Bank survey found that among rural households, 80% reported a reduction in income related to COVID-19, and 40% of farmers said that their farm incomes had fallen by half or more—mainly because they could not sell as much as before or at as high a price, but also because of bad weather. There was a clear rise in food insecurity, both in urban and rural areas.

Similar results emerged from a survey of 2,046 farm households in northern Thailand that was undertaken in September/October 2021 (Sapbamrer et al. 2022). The researcher found that 80% of households reported that their income had fallen due to COVID-19: 69% reported higher household expenses, and 74% said that output prices had fallen. One result was an increase in indebtedness: 48% of those surveyed reported taking on more debt, compared to just 4% whose debt burden fell. This survey showed high levels of stress and mental health challenges among those interviewed, plausibly exacerbated by the problems related to the pandemic.

The Thai government responded actively to the COVID-19 pandemic, providing substantial levels of grants to farmers and cash transfers to the self-employed (the No One Left Behind program), by topping up the state welfare card payments, and with the We Win payments. The World Bank phone survey found that 85% of rural, and 75% of urban, households got some COVID-related social assistance between March 2020 and June 2021. The United Nations Economic and Social Commission for Asia and the Pacific (2023) reports that total spending on COVID-related social protection by the Thai government has amounted to $12 billion, or about $170 per capita (or about $300 per recipient, using the United Nations estimate that 42 million Thais, or 60% of the population, received subsidies).

3.8 Conclusion

Thailand has a fairly dynamic agriculture sector (outside of the rice sector), based on smallholder family farms. As recently as the 1970s, only 10% of households had access to electricity, one-third of the rural population was illiterate, and the government taxed rice exports heavily in order to finance industrialization and provided funding for irrigation, education, roads, and research. Most farmers turned to the informal sector for credit in this period, since other alternatives were lacking.

Since then, rural Thailand has been transformed. New crops, especially rubber and sugar, have become important (Oxford Business Group 2016a), and improved education has made it easier for young people to move to the towns and cities. As a result, rural poverty has fallen sharply from 74% in 1986 to 9% in 2019 (Wuttisorn 2014, World Bank 2022).

One of the catalysts for this transformation has been the expansion of credit, especially from formal sources such as BAAC and semi-formal sources such as the Village Fund. Banking facilities are widely available: almost all farmers have bank accounts, over 70% of farm households have taken loans, and fewer than 5% of households said (in 2014) that they could not borrow more for productive uses even if they were in need. The maturation of the system of rural credit owes much to the government-owned BAAC, which introduced group lending in the 1970s, thereby enabling farmers to borrow even without collateral. The incentives built into BAAC's interest rate structure, as well as its flexibility in administering loans, have created a loyal customer base; in addition, BAAC's extensive network of branches, along with a variety of savings instruments, have allowed it to expand its portfolio rapidly over time. While BAAC was heavily subsidized until the late 1990s, the bank has since turned to mobilizing deposits as its principal source of capital. The institution now makes a solid return on capital and does not require subsidies. The BAAC model of lending, and its transition from a highly subsidized lender to an unsubsidized and profitable institution, has relevance for other countries. It should also be noted that while external forces required BAAC to evolve, the pace at which this was achieved was manageable.

Thailand's other rural financial innovation was the Village Fund, which was originally designed to provide microfinance to those who might want to explore projects outside of agriculture. The Village Fund helped bring credit to an underserved group of lower-income agricultural households and had some impact in raising consumption and perhaps income. The Village Fund's strength rests on its reliance on village-level committees, whose knowledge of the financial situation of fellow villagers, and ability to pressure villagers to repay their loans, contribute toward solving the problems of adverse selection and moral hazard that undermine many credit enterprises. However, the Village Fund lacks a mechanism for growth, is not sustainable over the long run, and may be too reliant on the particularities of Thai rural organizations to be applicable in other contexts.

Thai policymakers need to address three main challenges when it comes to agricultural finance. The first is to expand crop insurance, which has limited traction mostly on rice in the country but is likely to need government support on rice and other crops for some time. It may take another decade for farmers to get used to the idea of paying for even partial crop insurance.

The second challenge is to spend government investments more effectively. A solid case can be made that agricultural research and development is underfunded (Fan, Yu, and Jitsuchon 2008), that irrigation projects are increasingly seeing diminishing returns, that investment in more roads or in further electrification has reached a limit in terms of its benefits, and that debt moratoria are ineffective except in the short term. In addition, the flow of people out of agriculture will continue; thus, government efforts will need to focus on educating and providing opportunities for this population.

The third challenge is to avoid undue subsidization of farm outputs (such as rice or rubber) or inputs (such as fertilizer). The government's overzealous effort to prop up rice prices after 2011 proved costly and inefficient. The more recent subsidies for rubber, a crop whose output has already doubled since 2000 and for which Thailand is now the world's leading producer, will not help equilibrate demand and supply.

The good news is that these are manageable challenges. Using the World Bank's taxonomy, Thailand became an upper middle-income country in 2011; its past experience may be helpful for poorer countries, but the issues of agricultural finance that the country now faces increasingly have more in common with those of rich countries than those of the world's poor countries.

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CHAPTER 4

Viet Nam: Dynamic Agriculture with Moderately Effective Microfinance

Jonathan Haughton and Shahidur R. Khandker

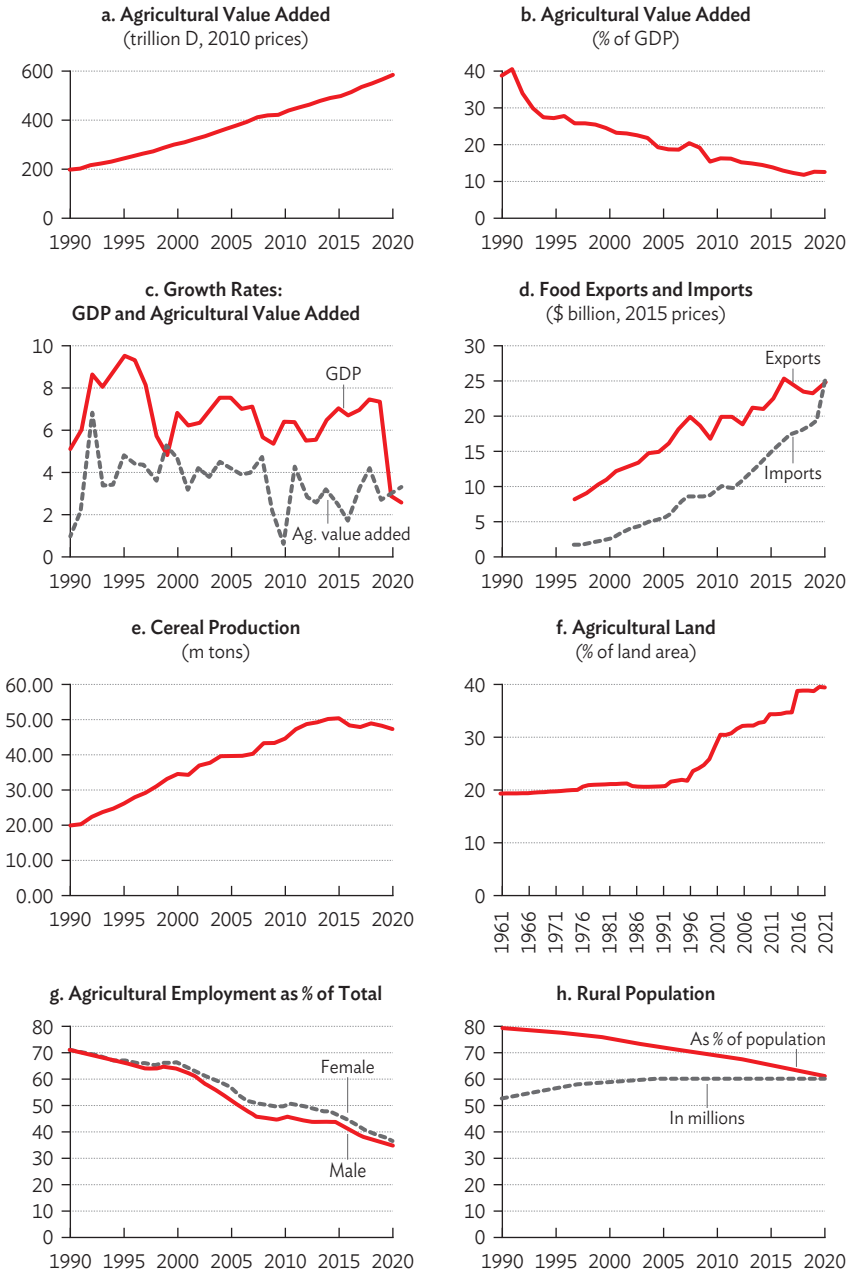
4.1 Introduction

Viet Nam is home to almost 9 million agricultural households; virtually all of them cultivate very small farms. Despite the overwhelmingly small-scale nature of Viet Nam's agriculture, the country's agricultural output has tripled since economic reforms began in the late 1980s. In the ensuing decades, the country has become a world-class exporter of rice, rubber, pepper, and coffee. What role did agricultural finance play in this transformation? Do farmers, both rich and poor, now have adequate access to the financial system in Viet Nam? Has agricultural credit, especially microcredit, had a measurable impact on agricultural households' output, incomes, and well-being? These are the main themes that we address in this chapter. We start with an overview of Viet Nam's system of agriculture and agricultural finance. We then examine farmers' use of the financial system and who has access to borrowing, model the impact of credit, and summarize the results and lessons learned.

4.2 Agriculture in Viet Nam

Since 1990, the value added by Viet Nam's agriculture has almost tripled, growing on average 3.7% per year (Figure 4.1a). Since 1989, when the policy of *Doi Moi* ("renovation") began to transform farming from the collective sector back to private farms, Vietnamese agriculture has become far more productive, as well as far more specialized. Between 1989 and 2013, Viet Nam's coffee production rose 29-fold, rubber output rose 22-fold, and pepper production jumped 30-fold (Table 4.1); Viet Nam is now the world's largest producer and exporter of pepper, the second-largest exporter of coffee, cassava and cinnamon, and the fourth-largest exporter of rubber and rice.

Figure 4.1: Recent Evolution of the Agricultural Sector in Viet Nam



Source: World Bank, World Development Indicators (accessed 9 January 2023).

Table 4.1: Vietnamese Agricultural Production: Selected Crops

	Annual Average Production (tons)			World Rank (by Production Volume)		% Growth
	1988–1990	2012–2014	2019–2021	Production	Exports	1989–2020
Coffee, green	58,300	1,331,207	1,765,091	2	2	2,928
Rubber, natural	52,746	928,360	1,226,811	3	4	2,226
Pepper (piper spp.)	8,864	132,353	274,404	1	1	2,996
Cinnamon (canella)	2,900	29,591	43,893	3	2	1,414
Cabbages and other brassicas	92,667	874,252	1,031,698			1,013
Watermelons	150,000	1,124,735	1,451,558			868
Tea		942,788	1,045,414	7	10	
Maize	774,583	5,122,296	4,578,880			491
Cashew nuts, with shell	106,667	277,654	344,620	4	(1)[a]	223
Orange and grapefruit	183,412	995,334	2,182,259			1,090
Mangoes, mangosteens, guavas	168,735	768,587	1,284,388			661
Cassava	2,566,833	9,901,095	10,414,883	8	2	306
Sugar cane	5,483,267	19,657,057	12,653,693			131
Rice, paddy	18,407,136	44,250,300	43,371,072	5	4	136
Beans, dry	97,100	169,321	160,773			66
Bananas	1,221,190	1,847,367	2,269,548			86
Coconuts	890,986	1,317,078	1,754,629	6	5	97
Pineapples	434,783	584,233	715,353			65
Sweet potatoes	1,913,343	1,395,491	1,347,151	10	9	–30

Note: Growth rate is total percentage change in volume of production between 1988–1990 and 2019–2021.

[a] For fresh and dried cashews.

Source: FAO (2023).

Similarly, in 1984, Viet Nam's cereal production was only 16 million tons, barely sufficient to feed the country's population; by 2014, however, cereal production had risen to 50 million tons (Figure 4.1e) and the average yield, at 5.6 tons/hectare (t/ha), was close to that of the People's Republic of China (5.9 t/ha) and far above that of Thailand (3.1 t/ha).

Despite the evident vigor of Viet Nam's agricultural sector, its share of gross domestic product (GDP) has gradually fallen, from over 40% in 1991 to 12% by 2019 (Figure 4.1b), in part because the nonagricultural sectors of the economy have grown particularly rapidly. Food imports have also increased rapidly, so Viet Nam is no longer a consistent food exporter (Figure 4.1d). However, Viet Nam's agricultural sector remains large enough to impact overall GDP growth, as Figure 4.1c shows.

The recent growth of Viet Nam's agricultural output is due in part to an extension in the land area devoted to crops and livestock; until the early 1990s, this land amounted to just over 20% of the country's total land but has since risen to almost 40% of total land (Figure 4.1f). Although agriculture, forestry, and fishing (a category known as AFF) still accounts for 37% of all employment in Viet Nam—with comparable proportions for men and women—there has been a clear downward trend. As recently as 1996, 70% of jobs were in the agricultural sector (Figure 4.1g). One result is that the rural population now represents 62% of the population (i.e., about 60 million people), down from 80% in 1985, and in absolute numbers the rural population has begun to decline (Figure 4.1h).

The average Vietnamese farm holding in 2014 was just 0.6 hectares, although the average for households reporting agriculture as their main source of income is 1.45 hectares. Only 0.4% of farms are larger than 10 hectares; collectively, these larger farms account for just 8.3% of the country's farm acreage, as Table 4.2 shows. When the government decollectivized agriculture after 1989, it limited farm size; a further law established in 2003 limited land holdings to no more than 3 hectares (Dao and Nguyen 2015). Under the constitution, land may only be owned by the state, but individuals may obtain land use rights (National Assembly of Viet Nam 2004, Article 67). The 2014 Land Law loosened limits on the area of land that individuals may own, for instance to 20 hectares, for each type of land used for annual crops such as rice; under the amended law, land rights also typically last for 50 years (Dao and Nguyen 2015).

Just over 90% of Viet Nam's farm households now have formal land-use-right certificates (USAID 2013); this increasingly secure land tenure has had a measurable effect in boosting the production of long-term crops (Do and Iyer 2007). In addition to the 9.65 million traditional farm households enumerated by the Agricultural Census in 2011, an estimated 1,400 businesses (with 95 employees on average) and 6,100 cooperatives (with an average of 17 employees) "own" or operate land. However, Dao and Nguyen (2015) argue that farms are still too small and fragmented to be efficient and that consolidation has not yet occurred on a significant scale.

Given the rapid growth of Viet Nam's agricultural sector, it is tempting to assume that the country's financial system is basically supportive. For instance, the area planted to pepper rose by 74,000 hectares between 2008 and 2016 (GSO 2017); given an investment of about $20,000 per hectare, this represents a financial commitment of $1.5 billion. However, while substantial funding for agriculture has been available in the aggregate, we cannot assume that all farmers can access sufficient finance. In 2017, just 53% of farmers had a loan.

Table 4.2: Household Agricultural Holdings, Income Source, and Debt Use by Farm Size

Size of Holding (hectares)	Agricultural Holdings[a]			Mainly Agricultural Income[b] (%)	Any Debt Borrowers (%)	Agricultural Debt	
	Number ('000)	Number (%)	Area (%)			Borrowers (%)	Amount (%)
Under 0.2	2,451	27.5	3.5	11	32	12	10
0.2–0.49	2,690	30.2	10.5	24	37	18	20
0.5–0.99	1,462	16.4	12.6	45	44	27	16
1.0–1.99	1,276	14.3	21.6	60	46	33	24
2.0–4.99	855	9.6	31.7	63	50	35	21
5.0–9.99	146	1.6	11.8	67	37	27	3
10+	38	0.4	8.3	52	35	26	1
Total	8,919	100	100	31	39	21	100

[a] Includes agricultural and forest land; refers to households only. Total calibrated to 2011.

[b] These households get all or most of their income from agriculture.

Source: GSO (2014).

Agricultural finance may hold some promise for reducing poverty. Although Viet Nam's rural poverty rate continues to fall rapidly—from 21% in 2010 to 5% in 2020 using the GSO/World Bank poverty line (World Bank 2022: 3)—two-thirds of poor people depend solely on agriculture even though this group makes up just 16% of the population; and 79% of poor people are from minority groups, which constitute 15% of the population. Farmers are increasingly older people, and they may be ill-equipped to migrate to the country's booming towns and cities; in such cases, further improvements in income may need to come from greater agricultural productivity. Thus, it is important to determine whether better access to agricultural finance could help raise rural populations' economic position.

Agricultural finance clearly involves the banking system, but the government also plays an active role, investing in infrastructure such as roads, influencing prices, and fostering technology development and adoption. Thus, it is also worth examining whether existing government support for agriculture is sufficient or well directed.

It is in this context—a dynamic agricultural sector dominated by smallholder farmers constrained by availability of land and labor and a need to increase productivity and use more productive technologies in order to continue economic growth and reduce poverty—that we turn to a discussion of the role of agricultural finance. First, we ask whether farmers have at least some access to the financial system. Then we summarize the main elements of the financial system that concern farmers, paying particular attention to the two key institutions—the Vietnam Bank for Agriculture and Rural Development (Agribank, sometimes referred to as VBARD) and the Vietnam Bank for Social Policies (VBSP). We then turn our attention to the determinants of farmers' decisions about whether and how much to borrow, before examining the impact of that borrowing on household incomes and profit.

4.3 Are Farmers Banked?

The first question we address is whether farmers have access to the financial system in Viet Nam. In 2014, and again in 2020, a community survey undertaken as part of the Vietnam Household Living Standards Survey (VHLSS) asked local leaders from where households in the commune obtained loans, if they obtained loans at all. Essentially all communes reported borrowing from at least

some sources, and in 98% of communes there were households that borrowed from commercial government banks (mainly Agribank). The variety of sources of credit is striking, with at least two-fifths of communes reporting that there was borrowing from private banks, credit organizations (such as VBSP), sociopolitical organizations (such as the Women's Union), individual lenders, and family members. In sum, both formal and informal credit appears to be available in most parts of Viet Nam. On the other hand, some of the institutions were not convenient: on average, the nearest bank was 10 kilometers away, and even sociopolitical organizations and community groups were typically not close by (last column, Table 4.3). This may help explain why credit from individual lenders and family members remains widespread, a point also noted by Duong and Antriyandarti (2022).

Table 4.3: Sources of Borrowed Funds in Communes

	% of Communes		Distance to Outlet (km)
Borrowing is Done From	2014	2020	2020
Government commercial banks	94	98	9.7
Private banks	34	53	10.9
Credit organizations	58	62	8.2
Sociopolitical organizations	45	46	6.3
Community groups	5	8	3.4
Individual lenders	50	47	2.6
Individual traders or input suppliers	14	17	2.9
Friends, relatives	62	66	
Other sources	2	1	
Memo: From any informal source	71		

km = kilometer.

Note: Data are based on 7,927 responses from the community survey component of the VHLSS surveys.

Sources: GSO (2014, 2021).

Nguyen et al. (2011) argue that credit is widely available to households throughout Viet Nam, but not everyone agrees; Duong and Izumida (2002) make the case that rural households still face many barriers to credit.

Using data from a survey of 932 households in four provinces in 1997 and 2002, Barslund and Tarp (2008) found limited evidence of credit rationing; only 9% of loan applications were rejected, and just 8% of households refrained from requesting credit even though they would have liked to borrow. However, they could not rule out the possibility that households would have wanted to borrow more and so in fact might be credit rationed. Barslund and Tarp's findings are consistent with those of Rand (2004), who found that only 14% of enterprises in Viet Nam were credit constrained and that this rate is lower among household enterprises. More recently, de Brauw et al. (2020) note that according to the Agricultural Census of 2016, 31% of rural households reported having an unmet need for credit. And the VHLSS of 2020 found that the main challenges reported by farmers were low prices (mentioned by 56%), unstable or inaccessible markets (51%), and difficulty accessing capital (45%) (GSO 2021: 28).

In 2020, the VHLSS also reported on the mechanisms that were used to save and build wealth, with the results that are summarized in Table 4.4. The use of savings books is widespread, but only one in five communes report that people tend to save in bank accounts (i.e., current accounts) or other financial instruments. The importance of gold and gems as a store of value suggests that financial instruments are not seen as attractive vehicles for saving.

Some further information on financial inclusion comes from the Multiple Indicator Cluster Survey (MICS) of 2020–2021 (General Statistics Office and UNICEF 2021). Using MICS data (UNICEF n.d.), we estimated that while 59% of Vietnamese households had a bank account (Table 4.5), the proportion was just 49% for farmers and 22% for minority households. The MICS survey creates an index of "wealth" based on survey information on household assets; by this measure, most households in the top quintile have bank accounts, but only 19% of poor people do.

Table 4.4: Vehicles for Savings, 2020

	% of Communes
Buy gold, gems	77
Buy land	80
Buy animals	20
Buy housing	50
Buy production equipment	35
Hold cash	44
Put in bank account	21
Put in savings book	84
Put in rotating credit fund	27
Other savings vehicles	<4

Source: GSO (2021).

Table 4.5: Proportion of Households with a Bank Account, 2020–2021 (%)

	All	Kinh	Minorities	Q1: poor	Q2	Q3: mid	Q4	Q5: rich
Farmer	49	56	22	19	38	59	76	91
Nonfarmer	68	69	49	18	45	62	81	95
All Viet Nam	59	63	28	19	41	61	79	94

MICS = Multiple Indicator Cluster Survey, Q = quarter.

Notes: Kinh includes Hoa. Q1, etc. refer to quintiles of "wealth" based on the MICS survey data. "Farmers" are households who own some agricultural land.

Source: General Statistics Office and UNICEF (2021).

Table 4.6 provides some information about the reasons why individuals did not have a financial account for the 71% of farmers and 68% of nonfarmers who were unbanked (i.e., did not have an account) in 2014. The data come from the data collected in 2014 by the Gallup Organization for the Global Financial Inclusion (Findex) database project (Demirguc-Kunt et al. 2015).

Table 4.6: Reasons for Not Having a Bank Account, 2014 (%)

	Farmers		Nonfarmers	
	All	Need	All	Need
Too far away	18	20	12	7
Too expensive	7	12	5	5
Lack documentation	2	5	6	5
Lack trust	2	0	3	3
Religious	0	0	1	1
Lack money	50	55	50	55
Family member has an account	17	27	21	23
Cannot get an account	7	4	13	12
No need	72		70	
Observations	285	61	713	151
% of group (e.g., of all farmers) without an account	71.1	20.7	68.2	20.6

Notes: Respondents may give more than one answer. The "need" columns refer to households that do not report that they had "no need" for credit.

Source: Demirguc-Kunt et al. (2015).

The Vietnamese data come from interviews with 1,000 individuals aged 15 years or older, chosen to be representative (after the use of sampling weights) of the population at large. Although the data are somewhat dated, they remain relevant: among unbanked farmers, 72% said they did not need an account (column 1 in Table 4.6); of those who reported needing an account, 27% said that another family member already had an account, while 55% said they lacked the money for an account (column 2 in Table 4.6). Very few of the unbanked farmers said that they lacked trust in the banking system, could not get an account, or had religious objections; some said that it was too expensive to open an account, and about 20% of unbanked farmers who expressed a need for an account said that the nearest formal facility was too far away.

Although half of farmers do not have a bank account, they are increasingly connected, with 97% having mobile phones (Table 4.7) and 70% having internet access at home. As mobile banking becomes more prevalent, even farmers will become more financially included. However, Viet Nam has been slow to embrace the payments revolution: according to the Findex survey of 2017, only 20% of Vietnamese households who got payments from the government received them electronically, compared to 57% in India and 75% in the People's Republic of China. And 90% of social assistance payments during the coronavirus disease (COVID-19) pandemic were paid out in cash (World Bank 2022: 172).

Table 4.7: Information Technology Access for Farmers and Nonfarmers, 2020–2021 (percentage)

	Farmers	Nonfarmers
Own a computer	22.0	42.1
Own a mobile phone	97.1	97.7
Have internet access at home	70.2	84.9

Note: "Farmers" are households who own some agricultural land.

Source: General Statistics Office and UNICEF (n.d.).

Further information on financial inclusion is given in Table 4.8, based on the Findex survey of 2017. The survey does not identify farmers per se, but it does ask whether the respondent "received agricultural payments in the last 12 months;" 37% responded affirmatively, and we refer to them as "farmers."

Table 4.8: Indicators of Financial Inclusion from Findex Survey, 2017

Income Quintile	Farmers				Nonfarmers			
	Have an account (%)	Borrow (%)	Borrow for ag/bus[a] (%)	N	Have an account (%)	Borrow (%)	Borrow for ag/bus[a] (%)	N
1. Poorest	19.1	70.2	27.1	67	16.8	37.2	8.8	111
2	25.5	52.2	22.4	43	22.0	44.6	8.4	137
3. Middle	25.9	61.1	25.9	46	33.0	46.9	11.7	141
4	25.7	60.4	15.6	34	36.4	43.9	14.1	174
5. Richest	29.9	61.9	30.3	37	51.1	49.1	13.7	212
Total	**24.0**	**62.5**	**24.9**	**227**	**33.0**	**44.7**	**11.6**	**775**
Memo: 2014	**28.9**	**53.2**	**13.1**	**272**	**31.8**	**44.3**	**4.8**	**728**

N = number of observations.

Notes: "Farmers" are defined as those who "received agricultural payments in the past 12 months" and consist of 36.8% of the (weighted) sample, which collected information from 1,000 individuals aged 15 years and above.

[a] "Borrow for ag/bus" refers to the proportion of respondents who report that they borrowed for agricultural or business purposes.

Source: Based on Findex surveys for Viet Nam, 2014 and 2017 (Demirguc-Kunt et al. 2015, Demirguc-Kunt et al. 2018).

The survey found that just 24% of farmers and 33% of nonfarmers had bank accounts in 2017, levels similar to those seen in 2014 but well below those reported in the MICS survey for 2020–2021 (Table 4.8). These numbers are far lower than those observed in Thailand (87% and 73% in 2014, respectively), and indeed are among the lowest levels anywhere (IMF 2022).

Despite the low proportions of households with a formal bank account, the Findex data show that 63% of farmers and 45% of nonfarmers borrowed in 2017, proportions very similar to those found in Thailand (56% and 47% in 2014, respectively). Farmers were more likely than nonfarmers to borrow in all quintiles, and borrowing rates did not differ systematically from quintile to quintile.

The Findex questionnaire also asked about the purpose of the borrowing. An estimated 25% of farmers and 12% of nonfarmers reported borrowing for "farm/business purposes;" these rates are about 5 percentage points lower than those observed in Thailand in 2014.

While the Findex data come from a comparatively small sample and from relatively straightforward questions, they do point to several conclusions. First, financial inclusion is far from universal in Viet Nam. In part, this is a demand-side problem of cost rather than a supply-side problem of trust, paperwork, or bureaucratic rejection, although on the supply side, institutions have been slow to move to mobile banking, and interest rate ceilings limit commercial lending to agriculture.

Second, Viet Nam's financial system is not widely used for agricultural transactions. Of those receiving agricultural payments (in 2014), 99% said that the payments were received in cash, and less than 1% received payments into a bank account or via a mobile phone. Nguyen et al. (2017) note that "non-cash payments ... are not accessed by the majority of rural people;" they further argue that the payment infrastructure is weak and the products poorly designed. On the other hand, of the 29% of farmers with a financial account, 64% reported making a deposit and/or withdrawal over the previous year and 46% said that they saved money using an account at a financial institution or in a savings club.

Third, it remains unclear whether poor farmers are underserved; poor farmers' borrowing rates, whether for agricultural purposes or overall, are comparable to those of better-off farmers (Table 4.8). However, the Findex data do not adequately measure the potential unmet need for credit or the sources and terms of that credit. Before examining these issues in more detail, we first need to summarize the main features of Viet Nam's financial system insofar as it relates to the agricultural sector.

4.4 Institutions of Agricultural Credit

Viet Nam's financial system relies almost entirely on banks, which account for 96% of financial-sector assets. According to the International Monetary Fund (IMF), banking sector assets were equivalent to 136% of GDP in 2021—a high level of financial deepening for a country at Viet Nam's stage of economic development, and well above the world average of 70%. Viet Nam's banking system is dominated by the four large banks listed in Table 4.9 (Reuters 2016), of which Agribank is the second-largest and the only one of the four to still be fully state-owned. Collectively, these four banks hold about 44% of the assets in the banking system. Their role is complemented by about 28 other commercial banks, about 50 branches of international banks, and two "policy lenders"—the Vietnam Development Bank and the Vietnam Bank for Social Policies.

Table 4.9: Principal Banks in Viet Nam

Bank	Short Name	Assets, D trillion, 31 Mar 2022
Vietnam Bank for Industry and Trade	VietinBank	1,664
Bank for Investment and Development of Vietnam	BIDV	1,848
Bank for Foreign Trade of Vietnam	Vietcombank	1,463
28 other joint stock commercial banks		6,934
Subtotal: Joint stock commercial banks		11,908
Vietnam Bank for Agriculture and Rural Development	VBARD, Agribank	1,737
Vietnam Bank for Social Policies	VBSP	262[a]
Branches of international banks		c. 1,400

Notes: The exchange rate was about D22,600 per US dollar at end-March 2022, so D1,000 trillion was about $44 billion.

[a] As of 31 December 2021.

Sources: S&P Global (2022); VBSP (2021).

From the point of view of agricultural borrowers, the most important banks by far are Agribank and VBSP. Together these two banks served over four-fifths of microfinance clients and outstanding microloans. Agribank also extends larger loans to farmers than VBSP does. Further microfinance services are provided by the 1,177 member-based People's Credit Funds (which have 1.7 million clients), two licensed and 50 semiformal microfinance institutions (MFIs), social funds organized by local governments, and donors (ADB 2015). While microfinance is not synonymous with agricultural lending, most microlending occurs in rural areas, mainly to farmers. Table 4.10 summarizes the nature and extent of microfinance lending and saving in 2013. VBSP was by far the dominant microlender in that year.

The Vietnam Bank for Social Policies is one of the largest microcredit providers in the world (see Table 4.11). It had almost 7 million active borrowers in 2017, half of whom were women, and a gross loan portfolio of more than $7 billion. Most of the growth in the number of borrowers occurred prior to 2010; since then, VBSP's portfolio has grown through increases in loan size, with the average loan now around $1,120, but the number of borrowers has fallen by over a million since 2010.

Table 4.10: Microfinance Lending and Saving (c. 2015)

Institution	Borrowers (million)	Outstanding Loans ($ million)	Depositors (million)	Deposits ($ million)
VBSP	6.98	5,350	6.88	133
Agribank	1.49	1,390	1.05	1,164
PCFs	1.12	1,294	1.31	1,467
MFIs	0.77	189	0.56	48
Total	**10.36**	**8,223**	**9.80**	**2,812**

Agribank = Vietnam Bank for Agriculture and Rural Development, MFI = microfinance institution, PCF = People's Credit Fund, VBSP = Vietnam Bank for Social Policies.

Note: Based on loans of up to D30 million ($1,423).

Source: ADB (2015).

Table 4.11: Vietnam Bank for Social Policies in Comparative Perspective

MFI Name	Country	Number of Active Borrowers (million)	Female Borrowers (%)	Assets ($ million)	Gross Loan Portfolio ($ million)	Mean Loan/Borrower ($)	Mean Loan/GNI/Cap (%)	Deposits/Loans (%)
2017 FY								
VBSP	**Viet Nam**	**6.77**	**51**	**7,501**	**7,238**	**1,120**	**59[a]**	**42**
Grameen Bank	Bangladesh	8.11	97	2,807	1,633	198	20	146
Bandhan	India	6.53[a]		7,429[c]	5,071[c]			112[c]
BRAC	Bangladesh	5.74[b]	87	2,881[b]	2,226[b]	353	35	34[b]
Compartamos Banco	Mexico	2.44[b]	89[b]	1,485[b]	1,178[b]	484[b]	5	11[b]
Spandana	India	1.59[c]	100	560[c]	544[c]	307[b]	20[b]	0
2010 FY								
VBSP	**Viet Nam**	**7.85**	**51**	**4,379**	**3,018**	**562**	**51**	**35**

continued on next page

Table 4.11: ***Continued***

MFI Name	Country	Return	Financial Revenue	Financial Expense	Provision for Bad Loans	Operating Expense	Borrowers per Staff Member ($)	Average Salary/ GNI per Capita (%)	Operational Self Sufficiency (%)
		As % of assets							
2017 FY									
VBSP	**Viet Nam**	**0.2**	**8.7**	**5.6**	**0.3**	**2.7**	**685**	**7a**	**102**
Grameen Bank	Bangladesh	1.0	15.4	6.9	1.2	6.3	491	7	107
Bandhan	India	3.8[c]	14.8[c]	4.1[c]	3.5[c]	3.5[c]	227	6[a]	108[b]
BRAC	Bangladesh	1.2[b]	27.0[b]	13.7	1.3[a]	25.0[b]		2	134[c]
Compartamos Banco	Mexico	7.2[b]	62.3[b]	5.8[b]	7.2[b]	39.5[b]	150[b]		118[b]
Spandana	India	7.9[c]	26.6[c]	9.1[c]	1.2[c]	4.4[c]	393[b]	2	182[c]
2010 FY									
VBSP	**Viet Nam**	**(2.5)**	**6.2**	**4.1**	**0.9**	**3.7**	**928**	**8**	**72**

FY = financial year, GNI = gross national income, MFI = microfinance institution, VBSP = Vietnam Bank for Social Policies.

[a] 2016; [b] 2018; [c] 2019.

Source: World Bank MIX Market Databank. https://databank.worldbank.org/source/mix-market (accessed 25 January 2023).

VBSP specializes in making small short-term (usually one year or less) loans to poor households, although some loans are for periods up to five years (World Bank 2019). According to the 2018 VHLSS, 65% of VBSP loans went to poor rural households in 2018, at an interest rate of 0.7% per month. About two-fifths of VBSP's funding came from deposits in 2017, with the remainder coming from the state budget (15% of the total), loans from the State Bank of Vietnam and donors (5%), government-guaranteed bonds (15%), and from financial institutions under a mandatory 2% contribution scheme (35%).

VBSP became operationally self-sufficient by 2017, in the sense that its revenues cover its financial expenses, operating costs, and impairment losses (World Bank MIX Market Databank 2023), but this has only been true since 2014. In this respect, the institution is similar to its peers in India and Bangladesh such as Bandhan, Spandana, the Grameen Bank, and BRAC (Table 4.11). Loans to ethnic minorities charge an interest rate of just 1.2% per annum (World Bank 2019), which helps explain the importance of such loans in the VBSP portfolio but also undermines the financial sustainability of the bank.

While VBSP pays its staff well, its operating expenses are a little less than 3% of its assets, in part because of the large number of loans per officer (Table 4.11). VBSP has 690 branches of its own and services a further 10,400 transaction points per month with mobile units; however, much of its lending is done through mass organizations, including the Youth Union, and the Women's Union, which has 15 million members and administers about half of VBSP's loans (Bezemer and Schuster 2014). In return for a modest fee, equivalent to 0.165% of the outstanding balances collected on time, these organizations set up borrowing groups (of which there are 170,000), sometimes require compulsory savings, and help collect loans when they are due.

Officially, VBSP's default rate is less than 2% (VBSP 2022: 52); however, some believe it to be considerably higher (DFC, Mekong Economics, and World Bank 2007), and there is evidence that significant numbers of VBSP borrowers do have difficulty repaying their loans (Nguyen et al. 2011). VBSP has been slow to develop electronic systems or phone apps for credit management, money transfer, and payments and deposits. As of the end of 2021, only 15,518 people had used its electronic app, which had had only a limited rollout.

Viet Nam's other major agricultural financial institution, Agribank, is a classic agricultural lender. With 2,225 branches and transactions offices, Agribank has a loan portfolio of $58 billion (D1,314 trillion as of end-2021), of which two-thirds was lent "to agriculture and rural areas." Its pretax profit of D15 trillion in 2021 represented a 20.1% return on equity (Agribank 2022). Increasingly, Agribank has been concentrating on lending to larger farmers and to borrowers outside of the agricultural sector, but in 2018 an estimated 15% of its loans went to poor rural households (GSO 2019). The bank serves 6.6 million customers and issued 4.7 million cards (credit and debit) in 2021, generating a fifth of its service income from this source; a further 14% of its service income came from e-banking in that year.

The dominance of Agribank and VBSP in lending to farmers is due in part to the interest rate ceilings, which prevent commercial banks from charging more than 6.5% annual interest on loans to agriculture. Given the small size of such loans, and their riskiness, commercial lenders find it unprofitable to lend to small farmers. The government does provide interest subsidies for lending to favored sectors, but funding for the subsidies appears to be limited (World Bank 2019).

4.5 Are Farmers Insured?

Microinsurance, which seeks to protect low-income people from negative shocks (such as a drought) in return for the payment of a premium, is virtually nonexistent in Viet Nam, although there have been some experiments with microinsurance programs. The large state insurer, Bao Viet, ended its agricultural insurance product because it received higher claims than expected, as did Groupama, which faced claims ratios of up to 1,600% (Ramm and Ankolekar 2015). One reason for limited interest in microinsurance products may be because the government typically compensates farmers directly for losses caused by disasters triggered by natural hazards, following a prime ministerial decision of 2009. The national credit guarantee fund, managed by the Vietnam Development Bank, no longer functions, for lack of funds. It is widely held that most farmers do not fully understand how crop insurance works, and that they only buy into it when it is very heavily subsidized (World Bank 2019; Khuc et al. 2022).

On the other hand, the government fully subsidizes health insurance cards for old, poor, young, and disadvantaged people, although copayments remain high and represented almost half of total costs in 2009 (Ramm and Ankolekar 2015).

4.6 Patterns of Borrowing

We now turn to the questions of who borrows, from whom, and for what purposes. A study by DFC, Mekong Economics, and the World Bank (2007) focuses on a group they call the "bottom of the pyramid," consisting of the poorest 24% of the population, or 20 million people in 4.6 million households. The authors make the case that even this group has fairly good access to banking, receiving 5.3 million loans and accounting for 3.0 million deposit accounts in 2011, as Table 4.12 shows.

Table 4.12: Lending to the Bottom of the Pyramid (2007) and Microfinance Lending (2013)

	Bottom of the Pyramid, c. 2007		Microfinance Lending, 2013		
	Deposit Accounts ('000)	Number of Loans ('000)	Number of Clients ('000)	Loans Outstanding 2013 ($ million)	Average Loan per Client 2013 ($)
Bank for Agriculture (Agribank)	2,100	2,876	1,500	1,390	927
Vietnam Bank for Social Policies	**84**	**2,063**	**7,000**	**5,350**	**764**
VPSC (Postal savings)	100	–			
People's Credit Funds	400	250	1,100	1,294	1,176
Microfinance Working Group members	335	142	800	189	236
Total	3,019	5,331			

VPSC = Vietnamese Postal Savings Corporation.

Note: Refers to loans less than D30 million ($1,432).

Sources: DFC, Mekong Economics, and World Bank (2007); Bezemer and Schuster (2014).

Table 4.12 also shows some more recent information on "microfinance lending," defined as loans worth D30 million (about $1,432) or less in 2013. It is likely that most of these loans are going to relatively poor households. By this standard, the Vietnam Bank for Social Policies clearly dominates microlending—as noted earlier—although the Vietnam Bank for Agriculture and Rural Development (Agribank) and the 1,130 People's Credit Funds also lend significant amounts. By one estimate, 94% of active microfinance clients were women in 2008 (Bezemer and Schuster 2014: 17), although the figures reported by the Microfinance Information Exchange put the proportion closer to a half (see Table 4.11).

The data presented in Table 4.12 only cover lending by institutions, so they exclude borrowing from friends, family, and informal sources. Table 4.13 presents a more complete picture of borrowing by agricultural households, based on household-level data drawn from the VHLSS of 2004, 2008, and 2014—unfortunately, more recent microdata is not publicly available. The proportion of households that borrowed was 49% in 2008, fell to 46% in 2008, and then dropped to 38% in 2014.

Table 4.13: Sources of Borrowing by Agricultural Households

	Mean Value per Loan (D '000)			% of Agricultural Households that Borrow			% Distribution of Credit to Agricultural Households		
Source of loan:	2004	2008	2014	2004	2008	2014	2004	2008	2014
VBSP	4,275	7,770	19,415	5.7	14.4	19.2	5.2	10.9	20.4
Agribank	10,589	23,437	67,228	23.0	17.0	12.6	51.4	38.9	46.4
Other banks	24,969	151,691	159,671	1.4	1.3	1.1	7.2	19.1	9.6
Employment support fund	5,016	47,758	30,714	0.9	0.3	0.1	1.0	1.6	0.2
Credit organizations	9,729	17,558	62,773	2.3	2.2	1.5	4.7	3.8	5.2
Sociopolitical organizations	2,972	6,008	14,518	2.8	2.4	3.1	1.8	1.6	2.5
Individual creditors	6,549	13,060	29,188	5.1	3.6	1.2	7.1	4.6	1.9
Friends, relatives	6,136	14,871	40,177	15.6	12.8	5.7	20.2	18.5	12.5
Others	4,062	8,397	24,100	1.7	1.4	1.0	1.5	1.1	1.3
Total	**9,645**	**22,447**	**47,425**	**49.2**	**46.0**	**38.0**	**100.0**	**100.0**	**100.0**
Memo items:									
VBSP only	4,572	7,984	18,776	4.1	10.0	14.9	4.0	7.8	15.3
Agribank only	11,161	25,534	70,607	17.8	12.6	9.0	41.9	31.3	34.8
Borrowing, multiple sources	16,633	27,933	86,323	8.3	8.3	6.2	29.1	22.6	29.3
For comparison:									
Consumer price index	100	155	260						
Index of nominal GDP/capita	100	199	454						
Sample size									

GDP = gross domestic product, VBSP = Vietnam Bank for Social Policies.

Notes: Loan amounts are for borrowers only and are in nominal dong. The exchange rate in 2014 was approximately D21,000 per US dollar, so D19,415,000 was equivalent to about $925.

Source: GSO (2004, 2008, 2014).

Essentially all of the drop in borrowing can be attributed to a reduction in loans from friends and relatives (15.6% borrowed from this source in 2004, compared to just 5.7% in 2014), as well as from "individual creditors" (from 5.1% in 2004 to 1.2% in 2014). The value of institutional lending actually grew faster than GDP, so we cannot assume that formal credit became harder to get between 2004 and 2014. The reduction in informal borrowing probably reflects rising incomes, which reduced the need to take on short-term loans from these sources.

Table 4.13 also shows other shifts in the pattern of borrowing by farm households. The share of farm households borrowing from VBSP rose from 5.7% in 2004 to 19.2% in 2014, during which time the proportion borrowing from Agribank fell from 23.0% to 12.6%. Over this time, Agribank shifted its focus to larger loans; its average farm loan rose from D10.6 million in 2004 (about $650) to D67.2 million (about $3,100) in 2014. The average loan extended by VBSP also rose during this time, from D4.3 million to D19.4 million, as the institution attracted clients who had borrowed previously from Agribank. In principle, VBSP loans are destined for poor households, but in 2006 "only" 44% of its loans went to households so designated (compared to 11% for Agribank, as shown in Table 4.13). VBSP lends money under 22 distinct programs; as of the end of 2021, its lending went to poor and near-poor households (26% of the total), post-poor programs (18%), disadvantaged students (4%), and household businesses in extremely disadvantaged areas (11%); additional lending was provided for rural water and sanitation (18%), job creation (16%), and housing for poor people (3%) (VBSP 2022). With the rapidly shrinking share of the population that is in deep poverty, the bank has reoriented its lending to a broader set of programs than just a decade ago.

The rising market share of VBSP through 2014 was likely due in part to its attractive interest rates, which are consistently lower than those charged by most other formal institutions or by informal lenders. For instance, the median interest rate charged by VBSP in 2014 was 7.8%, compared to the 10.8% charged by Agribank and the 12% charged by other banks and by credit organizations (Table 4.14). Interest rates in 2014 generally exceeded the rate of inflation (which was just 4.1%), but in 2008 interest rates were substantially below the high, albeit unanticipated, inflation rate of 23%. Borrowers had locked into their fixed-rate loans before the spurt of inflation gave them a windfall.

Table 4.14: Annual Interest Rates by Lender

Lender:	2004		2008		2014		
	Mean	Median	Mean	Median	Mean	Median	Memo: % who borrow from:
VBSP	6.8	6.0	7.2	7.8	8.8	7.8	19.2
Agribank	11.5	11.8	15.7	14.4	14.8	10.8	12.6
Other banks	10.4	10.2	17.0	14.4	16.1	12.0	1.1
Employment support fund	5.3	6.0	26.5	7.8	13.6	2.5	0.1
Credit organizations	13.7	12.0	13.6	15.0	12.8	12.0	1.5
Sociopolitical organizations	9.6	6.0	7.9	7.8	8.2	7.8	3.1
Individual creditors	38.9	24.0	48.9	30.0	20.9	12.0	1.2
Friends, relatives	3.1	0.0	3.9	0.0	5.6	0.0	5.7
Others	3.2	0.0	4.8	0.0	36.9	7.8	1.0
Total	**10.9**	**6.0**	**12.4**	**7.8**	**11.2**	**7.8**	**38.0[a]**
Inflation rate (CPI)	7.8		23.1		4.1		

CPI = consumer price index, p.a. = per annum, VBSP = Vietnam Bank for Social Policies.

Notes:

1. Rates are those reported by agricultural households that borrow.
2. Reported interest rates exceeding 1,000% p.a. are excluded.

[a] Loans from any source.

Sources: GSO (2004, 2008, 2014).

Table 4.15 reports some information on the uses to which agricultural households say they put their loans. As borrowed funds are fungible, these figures may provide more information about households' intent than actual outcomes. In addition, the figures for 2014 are not exactly comparable with those of 2004 and 2008 due to a change in the questionnaire used. However, it appears that close to half of the borrowed loans are incurred for "productive" purposes and a further one-tenth are used to buy a house; relatively little borrowing appears to cover immediate consumption expenses or even medical care or durable goods.

Table 4.15: Uses to Which Agricultural Households Put Their Loans (%)

	2004	2008	2014
Production and working capital	43.61	25.69	*55.33*
Capital investment	8.38	17.3	
Debt repayment	5.93	7.83	*2.31*
House purchase	11.42	11.04	*12.26*
Wedding	1.5	1.54	*0.27*
Study	3.11	7.12	*13.19*
Medical treatment	8.12	6.9	*4.22*
General consumption	7.52	9.9	*3.72*
Food	1.11	0.53	
Durable goods	4.55	4.17	*3.22*
Water/sanitation	0.57	1.94	
Other	4.13	6.04	*5.49*
Total	100	100	100
Sample size	4,334	3,959	2,986
Memo: Sector in which production loan is used			
Agriculture/forestry/fishery	42.41	34.58	
Business and trade	4.73	3.94	
Services	1.68	2.17	
Other	3.11	2.25	

Note: Classification question in 2014 differed from that used in 2004 and 2008.
Source: GSO (2004, 2008, 2014).

4.7 Formal Analysis of Borrowing

In 2014, 38% of agricultural households had contracted debt of some sort, although not necessarily for agricultural purposes. In this section, we examine why some agricultural households borrow and others do not; for those households that borrow, we explore the correlates of that borrowing. The data come from the VHLSS of 2014 and refer only to households generating some amount of income from agriculture.

We estimate two models, one for total debt and the other for "agricultural debt" only. The latter measures the borrowing that households report as being used for agricultural purposes. We use a Heckman two-step procedure, in which we first estimate a probit equation to determine who borrows and then estimate a model of the amount borrowed using a least-squares equation in which we include a measure of the non-selection hazard (the inverse Mills ratio) from the first equation. This procedure helps us to correct for sample selection bias in the second stage; in addition, the term is statistically significant in our estimated model, so this modeling approach is appropriate. We include the variables that measure whether households could or would not borrow in the first, but not second, stage of the model.

Table 4.16 presents the results. Households are more likely to have more debt if they own land or other property or if they reside in the Central Highlands (where coffee farming is widespread). The amount of debt incurred is relatively low in the Red River Delta region and for households that have a high dependency ratio; it is also low for households that have bank accounts, suggesting that bank accounts are mainly used to hold savings, especially by those who may not need to borrow.

Table 4.16: Models of Borrowing for All Debt and for Agricultural Debt, Viet Nam, 2014

	Model 1: All Debt		Model 2: Agricultural Debt		Summary Statistics		
	Has Debt	Amount of Debt	Has Debt	Amount of Debt	Mean	Min	Max
Geographic Effects							
Urban (Yes=1)	9.622	−0.094	−1.588	−0.014	0.13	0	1
Region (Red River Delta = reference)					0.21	0	1
Midlands and N. Mountains	4.649	0.426***	7.329	0.572***	0.23	0	1
Northern and Coastal Central	−3.517	0.415***	14.063	0.533***	0.23	0	1
Central Highlands	25.043**	0.552***	22.466*	0.810***	0.08	0	1
Southeast	16.498	0.304**	16.393	0.613***	0.06	0	1
Mekong Delta	12.029	0.505***	22.659*	0.810***	0.19	0	1

continued on next page

Table 4.16: ***Continued***

	Model 1: All Debt		Model 2: Agricultural Debt		Summary Statistics		
	Has Debt	Amount of Debt	Has Debt	Amount of Debt	Mean	Min	Max
Characteristics of Head							
Age (years)	−0.694	−0.012	0.733	−0.014	50.4	16	97
Age squared ('000)	7.044	0.003	−6.912	0.049	2.72	0.26	9.4
Head is male (Yes=1)	3.78	−0.077	3.251	0.086	0.81	0	1
Head is married (Yes=1)	8.486	0.065	10.926	0.05	0.84	0	1
Head: has primary education	4.379	0.031	−1.509	0.037	0.27	0	1
Head: Has secondary education	12.212*	0.08	1.751	−0.037	0.44	0	1
Head: Has some higher education	35.502*	0.008	67.746***	−0.02	0.03	0	1
Household Characteristics							
Dependency (old+young/household)	4.161	−0.312***	2.486	−0.217*	0.26	0	1
Size of household	−2.874	0.067***	0.054	0.078***	3.97	1	11
Interest earned (D '000)	−0.64	−0.028***	5.366***	−0.041**	0.66	0	250.4
Nonfarm income (D '000)	0.398***	0.000	−0.126***	−0.002***	58.8	−1	990.1
Remittances received per hectare		−0.001		−0.003	2.47	0	335.3
Someone is member of association		0.188***		0.152***	0.52	0	1
Has residence permit (ho khau)		0.505*		0.509	0.99		
Classed as poor in village		0.308***		0.267***	0.15		
Has a bank account		−0.388***		−0.360***	0.13		
Has used an ATM		0.161**		0.055	0.16		
Characteristics of Farm							
Land area (hectare)	7.350***	0.01	2.236**	0.037***	0.79	0	48.8
Value of residence (million D)	27.036***	−0.031	53.193***	−0.121	0.38	0	18
Constant	−1.201	−0.871*	−32.804	−1.621***			
Inverse Mills ratio (non-selection hazard)	16.573		8.465				

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Table 4.16: ***Continued***

	Model 1: All Debt		Model 2: Agricultural Debt		Summary Statistics		
	Has Debt	Amount of Debt	Has Debt	Amount of Debt	Mean	Min	Max
Number of observations	5,410		5,410				
Mean value dependent variable (not logs)	0.384	18.281	0.204	7.238			
Pseudo R2	0.062		0.096				

Note: Sample is confined to households with at least some agricultural income.

* p<0.1.

** p<0.01.

*** p<0.001.

Source: Based on GSO (2014).

On the other hand, household borrowing is higher if a family member is a member of an association—a measure of "social capital"—or is classified as poor by the local People's Committee. There is a suggestion of a dualism here: Households with more assets borrow more, as they have collateral and may be trying to develop their businesses; however, households that are poor also borrow more, as they presumably have more pressing needs for cash or are being successfully targeted by VBSP and mass associations like the Women's Union.

4.8 The Impact of Microcredit

We now turn to the question of whether agricultural microcredit in Viet Nam has had an impact on household incomes or expenditure. With one exception, studies of the impact of microcredit in Viet Nam have found large positive effects. This is surprising because the almost-standard conclusion of recent rigorous studies in other countries is that the impacts of microcredit are positive but not particularly large. For example, Pitt and Khandker (1998) find that every additional Tk100 of microcredit in Bangladesh raised household consumption expenditure by Tk11 for male borrowers and by Tk18 for female borrowers.

Khandker (2005) confirms the poverty-reducing effects of access to microfinance in Bangladesh, especially for women, using more recent data. In Thailand, Boonperm, Haughton, and Khandker (2013) estimate that lending by the Thailand Village Fund raised income by 1.9% and spending by 3.3% in 2004, with the effects mainly concentrated among poorer households.

A handful of studies of the impact of microcredit have used randomized controlled trials, which in principle allow researchers to avoid the problem of selection bias that may occur with the sole use of data from existing borrowers. Banerjee, Karlan, and Zinman (2015) summarize the effects of six such studies undertaken in places as varied as Bosnia, Ethiopia, India, Mexico, Mongolia, and Morocco and with sophisticated empirical and econometric strategies. They conclude that microcredit has had a small positive economic impact. The accumulation of studies on the impact of microcredit, undertaken in a wide variety of contexts and reaching broadly similar conclusions, has driven the emerging consensus that microcredit contributes modestly to raising incomes and lowering poverty.

The World Bank (2013) found larger impacts, claiming that its Second Rural Finance Project in Viet Nam led to the provision of 275,000 more microloans, the creation of 274,000 jobs, and a 60%–65% increase in income for 445,000 families and small enterprises. However, the methodology used to arrive at these remarkable results is unclear.

In a pair of papers using data from a panel of households from the 2002 and 2004 VHLSS surveys, Cuong et al. (2007) conclude that "VBSP was quite effective" (p. 2) and that participation in VBSP loans raised household incomes and spending by 30% of the value of the loans. While they argue that VBSP lending was poorly targeted, they find that its lending reduced the headcount poverty rate by 5 percentage points and raised incomes for borrowers by two-thirds or more. The most problematic aspects of these studies are that the information on household borrowing collected in the 2002 survey is incomplete and is not comparable with the information gathered in 2004. More recently, Cuong and Van den Berg (2011) use the 2004 and 2006 VHLSS data—which solves the problem of comparability—and argue that over these two years, informal credit lowered the poverty rate to 39% when it would otherwise have been 47%, a remarkably large impact.

Duong and Nghiem (2013) also find that credit has a large effect in Viet Nam; they pool households from the living standards surveys of 1993, 1998, 2002, 2004, 2006, 2008, and 2010 and regress consumption (or income) on a dummy variable that is set to one if a household had a loan worth $500 or less. Their preliminary results indicate that having such a loan raises consumption by 50% and income by 8%. However, the authors do not adequately control for endogenous placement of loans, and they use measures of credit that are not always comparable across surveys.

Duy (2015) takes a somewhat different approach. Using a sample of 654 rice-growing households in the Mekong Delta, surveyed by the VHLSS of 2008, he estimates a stochastic production frontier and finds that households with credit are significantly closer to the frontier than those that do not borrow.

By way of contrast, Pham and Lensink (2012) also use data from the rural panel component of the 2004 and 2006 VHLSS surveys and estimate that microcredit has essentially no effect on self-employment profit, although they do find that (larger) Agribank loans have a positive impact on incomes. Their study uses a fixed-effects instrumental variables model that attempts to correct for selection bias. They conclude that further research on the impact of microcredit in Viet Nam is needed, with close attention to controlling properly for endogeneity.

Credit Impact: Data and Method

In this section, we present our own estimates of the impact of microcredit in Viet Nam, drawing heavily on, and then extending, the work of Haughton and Khandker (2016). We are able to take advantage of a panel of households covered by the Vietnam Household Living Standards Surveys (VHLSS) of 2004, 2006, and 2008. These are the only recent years for which there is a panel and adequate data on credit, and the questionnaires include a module that asks about household borrowing over the previous 12 months. There was some attrition (9.5%) in the panel between 2004 and 2006 (Baulch and Dat 2011), but overall, we have 1,848 households with observations for all three years.

These surveys coincide with a period when the Vietnam Bank for Social Policies was expanding its portfolio of microloans very rapidly; this helps us to identify the impact of these loans. VBSP lent to 6% of rural households in 2004, and this rate increased to 14% in 2008. Much of the growth was due to an expansion

in geographic coverage. In 2004, VBSP was present in 47% of all districts in 2004; in 2008, however, its coverage increased to reach 73%. The proportion of communes with a bank branch did not change during this period. While the average size of VBSP loans also rose modestly during this time, from D5.1 million to D7.6 million, many borrowers augmented their VBSP loans with loans from other sources, bringing their total borrowing to about 50% more than the VBSP amounts.

During this period, there was also extensive churning in the market for household loans, as shown in Table 4.17. The top panel of the table shows the proportion of rural households that borrowed from each major source in 2004, 2006, and 2008. For instance, 3.0% of households borrowed from VBSP in 2006 but not in 2004 or 2008. Although 33% of households did not borrow in any year, only 18% borrowed from any source in all three years. The bottom panel of Table 4.17 illustrates this point in another way, by showing the proportion of households that dropped or took up loans from each main lending group between the survey periods. Of the 5.2% of households that borrowed from VBSP in 2004, two-thirds had dropped out by 2006; however, the addition of 6.0% of households raised the VBSP penetration rate to 7.6% by 2006. In turn, half of these dropped out in the ensuing two years, but 8.6% of households were added to the VBSP roster in that period. Informal lending appears to be even more transitory. Thus, while credit may have been widely available during this period, households could not easily rely on multiyear credit from any one source.

If significant numbers of households do not have as much access to credit as they would wish, the provision of more microcredit through VBSP could potentially have a large impact by easing the financial constraints faced by farmers. On the other hand, if credit is already easily available, then the expansion of VBSP would largely displace other lenders and would have only a modest effect on borrowers, mainly by substituting low interest rates for high interest rates.

As documented previously, in almost all Vietnamese communes, there is a choice of credit sources, which makes it difficult to construct a randomized control trial that would allow us to measure the impact of credit in a compelling way. We are therefore constrained to use a quasi-randomized design but are able to make use of the availability of panel data over three years.

Table 4.17: Measures of Loan Churning in Rural Viet Nam, 2004–2008

	Did the household borrow in this year?							
2004	**No**	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**
2006	**No**	**No**	**Yes**	**Yes**	**No**	**No**	**Yes**	**Yes**
2008	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
	% of households							
VBSP	81.1	7.8	3.0	2.9	2.7	0.8	0.9	0.8
Agribank	66.6	5.2	5.6	2.4	9.5	2.0	4.1	4.6
Informal	67.6	6.0	6.5	1.6	2.9	11.2	1.9	3.6
Any loans	33.3	7.7	7.1	7.0	12.2	5.8	9.3	17.7
Borrowed in:	**2004**	**Dropped**	**Added**	**2006**	**Dropped**	**Added**	**2008**	
	% of households							
VBSP	5.2	−3.6	+6.0	=7.6	−3.9	+8.6	=12.3	
Agribank	20.2	−11.5	+8.0	=16.7	−9.7	+7.2	=14.2	
Informal	18.4	−14.1	+9.2	=13.5	−8.4	+6.1	=11.2	
Any loans	45.0	−18.0	+14.1	=41.4	−16.4	+13.4	=38.1	

VBSP = Vietnam Bank for Social Policies.

Source: From Haughton and Khandker (2016), based on the Vietnam Household Living Standards Survey rural panel, 2004, 2006, and 2008.

We first measure the effect of **intention to treat** on household outcomes. In principle, VBSP only extends microloans to poor households (as defined by the local People's Committee); we refer to this as eligibility (E_{ij}). It is also a practical necessity that there be a branch or mobile unit of VBSP nearby; if a commune has a branch, we consider the area to be treated (T_{ij}), following the terminology (and method) used by Pham and Lensink (2012). Then our model, which uses annual data, may be written as

$$\ln(Y_{ij}) = X_{ij}\beta + E_{ij}\gamma + (E_{ij}T_{ij})\delta + \varepsilon_{ij}, \quad (1)$$

where the outcome (Y) of household *i* in village *j* could be real consumption per capita, real income per capita, or real self-employment earnings per capita.

The outcome depends on household and community variables that are exogenous to borrowing (X), eligibility for a credit program (€), and the existence of a VBSP branch nearby (T). We are interested in the size and significance of δ. We estimate this equation using pooled data, with robust standard errors.

Our second **quantity of credit** model considers the amount of borrowing actually undertaken by a household. A fixed-effects version of this may be written as:

$$\ln(Y_{ijt}) = X_{ijt}\beta + E_{ijt}\gamma + C_{ijt}\delta + \eta_{ij} + \mu_j + \varepsilon_{ijt}, \quad (2)$$

where C measures the amount of credit per year from the source(s) under consideration. This approach can also be applied to Agribank lending (although E=1 in this case); the intention-to-treat model is not suitable for analyzing the impact of Agribank lending because the treatment term (T) is less likely to be random, leading to a concern about endogenous program placement.

Estimates of a simple pooled version of equation 2 are unlikely to be satisfactory because of the probable correlation between ε_{ijt} and C_{ijt}. There are at least three plausible reasons for this. First, if credit outlets are located in more affluent areas, then credit may be associated with better outcomes but may reflect endogenous program placement rather than a true effect. Second, there may be unobservable household or community characteristics that simultaneously influence loan participation and outcomes, such as a farmers' motivational level and competence. Third, selection bias may arise if the size of the loan is associated with unobservables.

One solution to these problems is to use household fixed effects. While this would remove the effects of any time-invariant unobservables, it could also prevent us from observing the effects of some potentially interesting variables. With fixed effects, the identification of loan effects relies on cases in which someone either starts borrowing or stops borrowing, either between 2004 and 2006 or between 2006 and 2008. While such cases are numerous, as documented in Table 4.17, there can be no assurance, a priori, that these cases are random. One way to address this problem of selection bias due to time-varying unobservable effects is to instrument the credit variable, C. We do this using interactions between the eligibility measure (E), treatment variable (T), and household characteristics (see Haughton, Khandker, and Rukumnuaykit 2014; Pitt and Khandker 1998;

Armendariz de Aghion and Morduch 2005; Pham and Lensink 2012), which gives instruments of the form $X_{ij}T_{ij}E_{ij}$. We test for the suitability of the instruments using a Sargan–Hansen J test and test for the need for instruments using the difference-in-Sargan test.

Credit Impact: Results

Table 4.18 presents the most important summary statistics for the three alternative dependent variables and for the control variables. Values are shown for the panel sample overall and for the subsamples of those who borrow from VBSP, from Agribank, and from informal sources. To avoid clutter, we only show the values for 2006 (the midpoint in the panel). The numbers shown in bold in shaded cells indicate that there is a statistically significant difference (at the 10% level) in the values between those who borrow from the source in question and those who do not.

Table 4.18: Descriptive Statistics for 2006

	Panel Sample	Borrowers from:		
		VBSP	Agribank	Informal
Dependent variables (unlogged)		*(D '000 p.a.)*		
Real consumption per capita (excluding durables)	7,229	**5,493**	6,952	**6,276**
Real income per capita	11,176	**7,397**	10,914	**8,283**
Real self-employment income per household	26,584	20,132	**36,298**	**20,064**
Control variables		*(percentages unless otherwise indicated)*		
Household is poor/VBSP-eligible	14	**44**	**11**	**25**
District has VBSP presence	54	**77**	**63**	51
Commune has VBSP presence	15	**34**	17	14
District has Agribank presence	80	82	**94**	80
Commune has Agribank presence	29	35	**44**	30
District has Agribank presence	83	**66**	85	**86**
Commune has informal lender	26	23	29	**38**
District has any lender	98	98	**100**	97
Commune has any lender	63	**80**	**75**	**74**
VBSP credit: proportion of households	8	**100**	**4**	8
Size of VBSP loan (D '000)	568	**6,874**	207	402

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Table 4.18: ***Continued***

	Panel Sample	Borrowers from:		
		VBSP	Agribank	Informal
Agribank credit: proportion of households	18	**09**	**100**	**13**
Size of Agribank loan (D '000)	3,714	829	**20,751**	1,268
Size of all loans (D '000)	7,919	**9,123**	**22,183**	15,029
Size of all loans (D '000), for borrowers only	18,133			
Microloan from formal source	31	**100**	**88**	24
Household size	4.86	**5.13**	**5.20**	4.86
Gender of head (male=1)	77	77	**84**	**73**
Age of head (years)	49.88	**45.88**	49.28	**47.32**
Education of head (years equivalent)	7.18	7.03	6.81	6.97
Head is literate (yes=1)	92	93	93	90
Number of household members not working due to disability	2	3	2	3
Household has single female head	14	11	**11**	**18**
Household has three generations	13	14	15	9
Household is in an urban area (yes=1)	23	14	10	15
Regions				
Red River Delta	22	**9**	**15**	25
Northeast	12	**17**	11	13
Northwest	3	**9**	2	3
North-Central	13	**23**	11	15
Central Coast	10	7	**7**	**5**
Central Highlands	6	**6**	8	**9**
Southeast	15	**9**	11	12
Mekong Delta	20	19	**34**	18
Ethnic kinh (yes=1)	85	**65**	85	86
Vehicle-accessible road or waterway to commune	98	99	**95**	98
Secondary school in commune?	37	**25**	**26**	**31**
Daily market in commune?	48	44	**35**	**40**
Bank or branch in commune?	29	**22**	**15**	**19**
Percentage of household under 16	26	**33**	26	**30**
Percentage of household over 60	10	**6**	**7**	**6**
Percentage of household that is female	51	50	**49**	51

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Table 4.18: ***Continued***

	Panel Sample	Borrowers from:		
		VBSP	Agribank	Informal
Percentage of household with a technical diploma	3	3	3	3
Percentage of household with some higher education	3	**1**	**1**	**1**
Crop land per capita (10,000 m^2)	0.08	**0.11**	**0.13**	0.06
Tree/forest land per capita (10,000 m^2)	0.04	0.04	0.05	0.03
Aquaculture water per capita (10,000 m^2)	0.01	0.00	0.00	0.01
Head has a spouse in the family	83	**87**	**87**	80
Percentage of household workers in agriculture	64	**72**	**79**	68
Number of households in village	2,068	**1,553**	2,083	2,039
Number of individuals in village	9,383	**6,926**	9,588	9,368
Commune poor (program 135)	18	**40**	18	16
Remote community	20	**36**	25	19
Number of poor households	339	336	350	362
Number of observations	1,848			

m = meter, p.a. = per annum, VBSP = Vietnamese Bank for Social Policies.

Notes: Figures in **bold** differ statistically from the reference group (at 10% significance or better). Individual sample weights used in most cases.

Source: Panel (of rural households) from Vietnam Household Living Standards Survey 2006.

Loans extended by VBSP go disproportionately to borrowers in poor villages or in more remote northern provinces. Fully 35% of VBSP loans went to households from minority ethnic groups, more than double the representation (15%) of these groups in the sample as a whole. In 2006, 44% of VBSP loans went to households that were classified as poor (compared to 14% of loans overall and 11% of Agribank loans). VBSP loans were on average less than half as large as those made by Agribank.

The first sets of results from our estimates in the intention-to-treat model (equation 1), using the panel data for 2004, 2006, and 2008, are shown in Table 4.19. The measure of impact is the log of real consumption per capita (excluding spending on durable goods); we focus only on lending by VBSP. The first column reports the results of a random effects specification (assuming exchangeability), while the second column includes household fixed effects. Both versions correct for potential heteroscedasticity. A Hausman test favors the fixed-effects specification ($chi\text{-}squared_{28} = -364$).

Table 4.19: Estimates of the Impact of Vietnam Bank for Social Policies Credit on the Natural Log of Real Consumption per Capita: Intention-to-Treat Model

	RE	FE
Eligible to borrow	−0.267***	−0.097***
	(0.024)	(0.028)
Eligible × Treated (district)	0.056*	0.062*
	(0.024)	(0.028)
Proportion <16	−0.345***	−0.242***
Proportion >60	−0.152***	−0.101
Gender of head (male=1)	−0.009	0.068
Proportion female	−0.037	−0.095
Kinh (yes=1)	0.165***	−0.064
Household size	−0.108***	−0.147***
Household size squared	0.04**	0.006***
Proportion with technical diploma	0.265***	0.025
Proportion with post-secondary education	0.421*	−0.001
Head is literate (yes=1)	0.024	0.040
Years of education of head	0.025***	0.002
Age of head	0.016***	0.012
Age of head squared	−0.000***	−0.000*
Household has head + spouse (yes=1)	−0.048	−0.050
Head is single female	−0.085	0.056
Three generations in household	0.007	−0.001
Disabled worker in household? (yes=1)	−0.050	−0.016
Crop land/cap ('000 m^2)	0.126	0.084
Tree land/cap ('000 m^2)	0.039	0.009
Aqua area/cap ('000 m^2)	0.184	−0.113
Proportion working in agriculture	−0.127***	−0.040
Road/canal to commune? (yes=1)	−0.004	−0.032
Bank in commune? (yes=1)	0.031	0.012
Market in commune? (yes=1)	0.031	0.028

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Table 4.19: ***Continued***

	RE	FE
Secondary school in commune? (yes=1)	0.062**	−0.007
Reg 2: Northeast	0.044	-
Reg 3: Northwest	−0.113*	-
Reg 4: North-Central	−0.126***	-
Reg 5: Central Coast	0.019	-
Reg 6: Central Highlands	0.075*	-
Reg 7: Southeast	0.177***	-
Reg 8: Mekong Delta	0.115***	-
Urban (yes=1)	0.047	−0.138*
Year: 2006	0.149***	0.160***
Year: 2008	0.139***	0.160***
Constant	8.380***	9.036***
N	5,544	5,544
adj. R-sq		
rho	0.439	0.716
sigma_u	0.262	0.453
sigma_e	0.285	0.285

FE = fixed effects, m = meter, RE = random effects.

Notes: Bracketed numbers are the (unsigned) standard errors.

* p<0.1.

** p<0.01.

*** p<0.001.

The coefficient of interest is δ, estimated to be 0.062 (s.e. = 0.028) in the fixed-effects version; this is statistically significant at the 5% level and shows a positive effect, which means that the availability of VBSP credit is associated with higher consumption spending per capita. The order of magnitude is plausible: a 6.2% increase in consumption is equivalent to about D2 million per household, or slightly over one-quarter of the average value of a VBSP loan (D7 million). Similarly, in a study of microfinance in Bangladesh, Khandker (2005) finds a Tk17 increase in consumption for every Tk100 lent.

Although they are not central to our study, it is reassuring that the signs of the other estimated coefficients in the intention-to-treat model are as expected: per capita spending is lower for households with many young or old dependents, for larger households, for those working in agriculture, and for households in the Northern Uplands and North-Central Coast. Conversely, households with higher per capita spending have better educated members, own more land, and are more likely to live in the south of Viet Nam or in the Red River Delta.

The results of a variety of other specifications of the left-hand variable are summarized in Table 4.20, where we present the estimates for the parameter of interest, δ. The effect of the availability of VBSP microcredit on consumption is significant, or close to significant, in all cases. In the preferred specification, with household fixed effects, the estimated coefficient in the income equation is comparable in magnitude to the one in the consumption equation, although not quite statistically significant, with a p-value of 0.13.

Table 4.20: Estimates of the Impact of Vietnam Bank for Social Policies Credit on Outcomes: Intention-to-Treat Model

	RE	FE	Sample Size
Ln(real consumption per capita)			
Eligible × Treated (district)	0.056* (0.024)	0.062* (0.028)	5,544
Ln(real income per capita)			
Eligible × Treated (district)	0.044 (0.037)	0.059 (0.039)	5,542
Ln(real self-employment earnings per household)			
Eligible × Treated (district)	0.004 (0.066)	−0.004 (0.069)	5,505
Ln(real nonagricultural earnings per household)			
Eligible × Treated (district)	0.154 (0.380)	0.140 (0.498)	2,205

FE = fixed effects, RE = random effects.

Notes:

1. Bracketed numbers are the (unsigned) standard errors.

2. All equations include the same control variables as shown in Table 4.18.

* $p<0.1$.

The bottom two rows of Table 4.20 estimate the effect of the availability of VBSP credit on earnings from self-employment, whether agricultural or nonagricultural. We find no statistically significant effects, which is consistent with the findings of Pham and Lensink (2012), who use a similar specification with data for 2004 and 2006 only. Credit appears to boost overall income but not income from self-employment, leading one to wonder what pathway leads from credit to higher income and consumption. The problem may lie with the low power of the tests, a concern raised by Banerjee, Karlan, and Zinman (2015); however, it is worth noting that in 2008, households reported that only one-quarter of VBSP loans were incurred for directly productive uses. Thus, it is more likely that much of the household borrowing from VBSP is used to smooth fluctuations in income or to address significant spending needs (for instance, medical care).

Table 4.21 shows the final set of results, including the key estimates of the quantity-of-credit model, for the cases in which the dependent variable is the log of real consumption per capita, real income per capita, or unearned income per household. The top panel presents estimates based on VBSP borrowing, while the bottom panel gives the results related to borrowing from Agribank. Of the three specifications used, the fixed effects using instrumental variables (FE-IV) models are statistically preferable to those with simple fixed effects (FE) or with random effects using instrumental variables (RE-IV), but we include the latter to show the robustness of the results. A Hausman test comparing the FE-IV and RE-IV specifications supported the fixed effects version in every case.

For the instrumental variables estimates, we use two instruments: the proportion of other households in a district that borrow from VBSP ("lender1") and this proportion interacted with the proportion of household members who are older than 60. The lender1 variable is exogenous to the household and is likely to be correlated with the household's borrowing from VBSP, but not with the impact that a VBSP loan would have on the household's consumption or income. The interactive term reflects the idea that a household with older members may be less interested in borrowing, even though it could use the borrowed money effectively.

We test the appropriateness of using instrumental variables using the conventional Cragg-Donald F test on the first stage equation, which was between five and six. This means that our instruments are not particularly strong. However, none of the Sargan–Hansen J tests came close to rejecting the null hypothesis of no correlation between the instruments and the residuals in the main regression, which means that the chosen instruments are not inappropriate.

Table 4.21: Estimates of the Impact of Vietnam Bank for Social Policies and Agribank Credit on Outcomes: Quantity-of-Credit Model

	FE	FE-IV	RE-IV	FE-IV Ver 2	Sample Size
VBSP					
Ln(real consumption per capita)					
Amount borrowed from VBSP	0.002	0.049	0.006	0.110	5,544
	p=0.16	*p=0.11*	*p=0.78*	*p=0.11*	
Ln(real income per capita)					
Amount borrowed from VBSP	−0.002	0.098	−0.020	0.180	5,542
	p=0.22	*p=0.04*	*p=0.46*	*p=0.05*	
Ln(real self-employment earnings per household)					
Amount borrowed from VBSP	−0.0001	0.041	0.008	0.141	5,005
	p=0.95	*p=0.48*	*p=0.88*	*p=0.31*	
Agribank					
Ln(real consumption per capita)					
Amount borrowed from Agribank	0.0002	−0.005	−0.005	n.a.	5,544
	p=0.05	*p=0.82*	*p=0.75*		
Ln(real income per capita)					
Amount borrowed from Agribank	0.0006	−0.050	0.047	n.a.	5,542
	p=0.33	*p=0.56*	*p=0.30*		
Ln(real self-employment earnings per household)					
Amount borrowed from Agribank	0.001	−0.033	−0.061	n.a.	5,005
	p=0.16	*p=0.58*	*p=0.42*		

FE = fixed effects, IV = instrumental variables, n.a. = not applicable, RE = random effects, VBSP = Vietnam Bank for Social Policies.

Notes:

1. All equations include the same control variables as shown in Table 4.18.
2. The instruments are (i) the proportion of other households in the district with a VBSP loan, and (ii) the product of (i) and the fraction of household members aged above 60.
3. The p-value of the Sargan–Hansen J test was greater than 0.65 in each case; a Hausman test always strongly favored fixed over random effects.
4. The FE-IV Ver 2 specification reports the coefficients of the variant on Equation (2) that interacts eligibility for VBSP loans with the amount of credit.

The median amount borrowed by a household from VBSP in 2008 was D7 million (about $400). If this were to rise by D1 million, then a household's per capita consumption could be expected to rise by 4.9%, or by about D350,000, according to the FE-IV estimate of the quantity-of-credit model. The estimate is close to being statistically significant (p-value of 0.11). The effect of VBSP borrowing on real income per capita is stronger and is statistically significant. We find similar results when the specification interacts the amount of VBSP borrowing with eligibility to borrow (not shown here).

VBSP is subsidized to the tune of about 2% of the value of its loans; if subsidization translates directly to lower interest rates (relative to alternative sources of credit), this alone would raise consumption and income by about D140,000 on a D7 million loan. However, the effects shown here are much larger than this, suggesting that at the margin, VBSP loans are being put to productive use.

From the bottom panel of Table 4.21, we see that borrowing from Agribank had no statistically significant measurable effect on consumption, income, or profit. There is no measure of eligibility here—in contrast to the case of VBSP, for which only poor households are eligible—so the identification of effects is more difficult.

4.9 COVID-19

In March 2020, in the early days of the COVID-19 pandemic, Viet Nam shut its borders and followed a zero-COVID policy. The policy was successful in limiting infections and deaths, and while economic growth slowed to 2.9% in 2020 (from 7.0% in 2019), the country did not experience a recession. By mid-2021 there was a surge of cases, so Viet Nam launched a vaccination campaign that saw 75% of the population vaccinated by the end of the year. The country then opened up to trade and, by March 2022, to tourism. GDP did continue to grow in 2021 (by 2.6%) and picked up steam in 2022 with growth of about 6.5%. Government social spending rose only modestly in response to the pandemic, and households mainly adopted "self-coping strategies" (World Bank 2021: xii). That said, a series of high-frequency telephone surveys of households showed that in June 2020, over half of households reported reducing consumption, 16% had borrowed from friends and family, and a further 5% borrowed from institutions in order to help them cope. The September 2020 survey found that 8% of households got support from a Vietnamese or international organization.

A reported 78% of the assistance was in-kind, with the rest either in-kind or in the form of discounts; there was little or no use of the banking system or mobile money to distribute benefits.

4.10 Conclusion and Policy Implications

Taken as a whole, Vietnamese agriculture has been very dynamic since the return to household-based farming at the end of the 1980s. There has been a significant expansion in the area cultivated, greater specialization in crops such as coffee and pepper, and rapid increases in yields. The sector now faces different challenges, however, including the need to adjust to a declining rural population and to consolidate small parcels of land. Meanwhile, 9 out of 10 poor Vietnamese live in the countryside, and most of them are involved in farming; thus, efforts to reduce poverty further will require supporting this group more intensively.

The role played by the financial sector in fostering the transformation of agriculture, and in improving the lives of poor farmers, remains unclear. Almost all agricultural transactions are still conducted using cash; in addition, only 49% of agricultural households had an account at a financial institution in 2021, although 63% of farmers report that they borrowed in 2017, and formal (and informal) sector credit is available in essentially every commune in Viet Nam. On the other hand, borrowing is not done consistently from one year to the next, and the terms of most agricultural loans are short, which does not favor long-term investments.

Larger farmers appear to be well served by Agribank, a classic large state-owned agricultural lender that appears to be profitable and has largely weaned itself off its dependence on farm lending. However, the Vietnam Bank for Social Policies continues to be an effective lender to poorer households, channeling half of its loans through the Women's Union, which forms groups of borrowers and oversees repayments. VBSP is no longer heavily subsidized directly by the state, but it does rely for a third of its capital on a mandatory 2% contribution from other financial institutions. The number of households borrowing from VBSP is declining, and the institution has been slow to embrace digital banking.

We find that VBSP lending does have a clear positive impact on consumption. Our estimates rely on a quasi-experimental design, applied to a panel of households surveyed in 2004, 2006, and 2008, during which VBSP was expanding rapidly.

One of the more plausible estimates suggests a gross return of close to 35% on borrowing, although different methodological approaches give estimates that vary substantially. Nonetheless, our best estimate is that the rural poverty rate in 2008, which was 24.9% using a poverty rate for our sample of D4.8 million per capita, would have been 25.6% in the absence of VBSP credit. If VBSP lending would have been half as large in the absence of a subsidy, this means that the $70 million subsidy pulled one-third of a percent of the population—about quarter of a million people—out of poverty. That is close to $300 per person taken out of poverty, which is not particularly cheap.

Our results are weaker than the effects found by some authors (Cuong et al. 2007, Cuong 2008, World Bank 2013); however, our results show somewhat stronger positive effects than those found by Pham and Lensink (2012), perhaps because we were able to use an additional round of panel data and thus increase the power of our estimates.

We do not find a strong impact of VBSP lending on incomes or on self-employment income. The latter finding is surprising because one would expect the productive impact of borrowing to act most strongly through the effect on self-employment (including in agriculture). One possible explanation is that only half of the loans are reported as being used for productive purposes.

However, the continued implicit subsidization of VBSP loans could also be justified if they were well-targeted to groups that are otherwise hard to reach. There is some evidence of this being the case: other things being equal, poor agricultural households are significantly more likely to get credit than those who are more well-off. In addition, 35% of VBSP loans go to minority households, even though these households constitute just 15% of the population of Viet Nam. An estimated 44% of VBSP loans go to households that are considered, by their fellow villagers, to be poor. Thus, it appears that VBSP loans are well-targeted.

Much of the recent writing on microcredit in Viet Nam has focused on the issue of governance and sustainability. The World Bank (2004) has cautioned about the governance structure of the VBSP. Similarly, Timberg and Binh (2011) are concerned about the sustainability of subsidized microcredit, as is Khoa (2013), while Nguyen and Le (2013) note that some microcredit schemes have closed after subsidies ended, highlighting the need to pay attention to sustainability.

The Government of Viet Nam has responded to this problem; in 2012, it approved a development strategy that aimed "to increase VBSP's stability and sustainability, transform it into a self-sustaining operation, and enhance its capacity to provide state policy credit to poor and near-poor households" (Bezemer and Schuster 2014: 34). Some progress has certainly been made in this direction.

Viet Nam has been relatively slow to embrace the digital transformation of banking (IMF 2022), but the fintech sector is now growing rapidly, and there is potential for expansion given the low bank penetration rate and the high level of mobile phone ownership. The government's National Digital Transformation Program aims for half of all banking operations to be online by 2025, and for half the population to have digital checking accounts by then (Samuel 2021; IMF 2022).

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CHAPTER 5

Bangladesh: How Microfinance Can Support Agriculture

Shahidur R. Khandker and Hussain A. Samad

5.1 Introduction

While agricultural gross domestic product (GDP) has been continuously decreasing over time, the agriculture sector still provides the bulk of rural employment and income-earning opportunities in Bangladesh. The sector accounted for about 12% of the country's GDP in 2021 and 38% of its overall employment in 2019 (World Bank 2021a).[1] Ensuring food for 165.2 million people in a country of 55,000 square miles poses a significant challenge for the Government of Bangladesh. The combination of increasing population and limited land for agriculture, along with agricultural seasonality and unpredictable weather due to climate change, has been a serious challenge to food production and food security. Moreover, as more than 80% of Bangladesh's land is cultivated by small- and medium-sized farmers, augmenting productivity through agricultural diversification with modern technology and investment has proven to be a daunting task.

Despite these challenges, Bangladesh's economy has grown by over 6%, with over 5% agricultural growth, over the last decade. Bangladesh has also achieved great success in reaching near-self-sufficiency in food grain (especially rice) production.[2] Rice is the country's most dominant crop, covering 75% of crop land, providing 48% of rural employment, and contributing 5% of the country's GDP (Hassan 2021). Bangladesh produced 38 million tons of rice in 2021 (FAO 2022).

The need to utilize land more productively has remained a policy priority of Bangladesh's government, as has the need to keep food prices stable, given the volatility in production and international/domestic prices due to climate change.

1 The GDP of Bangladesh was $416.3 billion in 2021.
2 During 2016–2018, the country's cereal import dependency was about 12.9% (United Nations n.d.).

The country needs diversification in crop cultivation, with an emphasis on high-yielding varieties and irrigation technologies. In addition, as growth in the labor force has been outpacing industrialization and urbanization, the country also needs diversification of rural employment. As private investment remains low, public support for agriculture, including food production and food prices, has been a substantial focus by successive government administrations.

For example, the Government of Bangladesh has pursued a policy of providing subsidized interest rates to boost food production and rural employment. Increasing agricultural productivity through modern seed and irrigation technology requires access to finance by small and marginal farmers, as many of them do not have enough savings to support the necessary investment in such technologies. Increasing self-employment, especially in the rural nonfarm sector, also requires access to affordable credit and other services. Since agriculture is prone to extreme weather events such as flood and drought, rural investment in general has remained low. In such a situation, farmers engaged primarily in agriculture cannot cope with the risks associated with diversifying their income and employment without public support.[3]

Historically, poor farmers' access to institutional credit has been limited in Bangladesh, despite government support. This is true for other countries as well. Credit constraints can significantly impact agricultural outcomes, such as farm output and employment (Feder et al. 1990; Sial and Carter 1996), farm profit (Carter 1989; Foltz 2004; Guirkinger and Boucher 2008), and farm investment (Carter and Olinto 2003). Recent efforts by the governments in many developing countries to improve smallholder farmers' access to credit have raised an interesting policy question regarding the role of government vis-à-vis financial institutions.[4]

[3] Government-targeted agricultural credit policy was implemented by state-owned commercial banks and specialized agricultural banks, while some government agricultural funds for on-lending were disbursed by a few microfinance institutions. Private commercial banks have also been urged to extend financial services to agriculture. On the other hand, microcredit institutions have directed credit and savings mobilization schemes to targeted poor in order to create nonfarm employment and complement the government's agricultural credit policy. These institutions have also extended lending services to include smallholders in recent years. More on this follows in later sections.

[4] There are a few randomized controlled trial studies that assess the role of household access to small-scale bank credit and microfinance (Karlan and Zinman [2010a] in South Africa, Karlan and Zinman [2010b] in the Philippines, and Banerjee et al. [2013] in India).

An important factor that determines farmers' level of investment is the production risk they face due to unpredictable weather, seasonality of crop cycles, and crop price fluctuations. For example, seasonality of income and consumption is a major factor driving marginal farmers to participate in microfinance institutions (MFIs) that aim to generate employment for poor people in the rural nonfarm sector (Pitt and Khandker 2002). Such borrowing not only helps farmers smooth consumption but also allows them to undertake high-return (although somewhat risky) activities in the agricultural sector (e.g., Pitt 2000). Improved access to credit and other financial services provided by MFIs has also helped agricultural households to diversify their income and employment (e.g., Pitt and Khandker 1998). Wadud (2013) observes that the recent expansion of microfinance into the agricultural sector has helped farmers use farm inputs more efficiently (Wadud 2013). By relaxing borrowing constraints, MFIs can help smooth consumption, diversify income, increase self-employment income, and reduce poverty. This potentially makes these institutions a better channel through which financial inclusion and agricultural productivity can be augmented. In a study in India, Binswanger and Khandker (1995) find that access to commercial banks led to increased agricultural productivity for those who could afford the collateral. However, the same study also finds that such access was not enough to increase agricultural employment because formal credit enhances agricultural mechanization.

In recent years, MFIs in developing countries have made some headway in reaching poor farmers with credit constraints; however, these institutions have little capacity to expand because they typically lack required licenses, on-lending funds, and variety in their financial products. As a result, they operate on a small scale, offering local and demand-driven options, such as group-liability lending, in order to reach clients and improve lender profitability. Thus, even though MFIs have helped smooth income and consumption by diversifying farmers' production and employment, they have not been successful in raising agricultural productivity through large-scale investment.

A variety of bilateral and non-government–funded programs have recently evolved to provide other options (Kloeppinger-Todd and Sharma 2010). For example, to address the issue of small farmers' limited collateral, lending strategies have been tailored specifically for the agricultural supply chain.

Farmers can borrow against output stored in licensed warehouses, and producers and processors can make binding contracts for the outputs for which processors repay the producer's loan to the bank. Credit access includes extending credit lines for agriculture directly at local banks, which then provide loans to farmers and rural entrepreneurs. Prior to the 1990s, the World Bank and other multilateral institutions managed the disbursement of agricultural finance directly through project implementation units (World Bank 2003). In Bangladesh, the World Bank supported the Financial Services for the Poorest Project, which was administered by the country's wholesale microfinance agency, Palli Karma-Sahayak Foundation (PKSF). PKSF provides funds to MFIs to lend money to small and marginal farmers for agricultural activities.

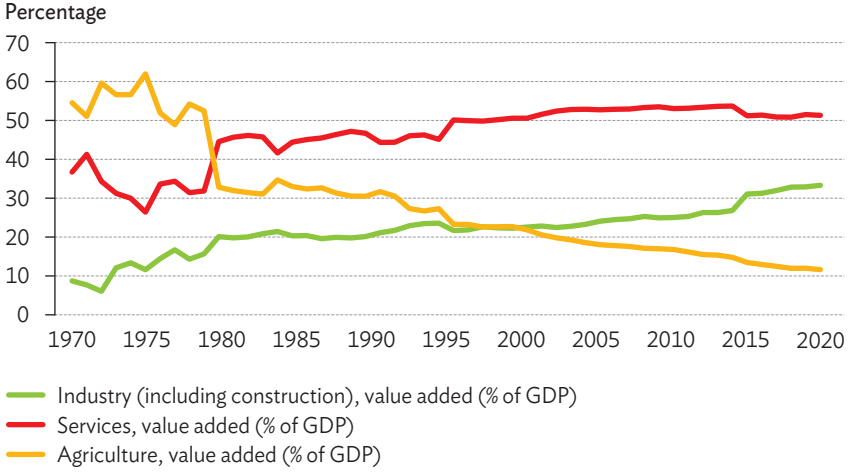
Because of a lack of efficiency in public institutions, such as the agricultural development banks implementing agricultural credit and targeted rural lending, it is important to evaluate the relative impacts of rural credit channels—commercial and agricultural banks and the MFIs—on agricultural households, taking into account the nature and extent of credit constraints faced by these households.[5] It is also important to investigate whether rural credit expansion by commercial banks and MFIs has helped poor farmers directly by stimulating agricultural productivity and income and/or indirectly by strengthening linkages between farm and nonfarm production and employment. This chapter addresses several policy questions in the context of Bangladesh: (i) whether rural credit expansion by MFIs and commercial and agricultural development banks has been able to extend financial services to agriculture; (ii) how the borrowing needs of agricultural households change across the landholding distribution; (iii) how access to credit has affected agricultural productivity, incomes, and income diversification; and (iv) how cost-effective it is to deliver financial services, especially credit, to agricultural households.

[5] As institutional finance targeted to agriculture is subsidized, this chapter focuses on the impacts of institutional finance to determine whether the institutions are delivering credit in cost-effective ways. Hence, we do not address the impact of informal borrowing in this chapter.

5.2 Government Support for Agriculture

Bangladesh's economy has grown by 6% over the last two decades. In the early 1970s, agriculture was the main driver of economic growth, accounting for more than 60% of GDP, followed by the trade and services sector and the manufacturing sector (Figure 5.1). However, during the early 1980s, structural changes took place in the sectoral composition of Bangladesh's GDP, with a drastic reduction in agriculture's share, consequential increases of the share of trade and services, and a modest increase in the share of manufacturing. In the early 1980s, agriculture accounted for 35% of Bangladesh's GDP, while the trade and services sector accounted for 45% and the manufacturing sector accounted for 20%. Over time, while trade and services grew at an accelerated rate and manufacturing registered modest growth, agriculture saw a further reduction in its share of GDP to almost 12% in 2021. During the past 10 years, the share of agriculture in the country's GDP fell 5 percentage points.

Figure 5.1: Distribution of Gross Domestic Product of Bangladesh by Sector

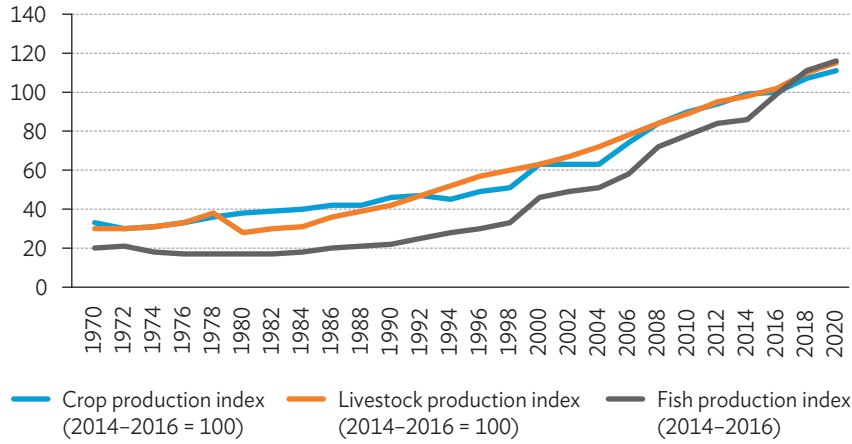


Source: World Bank (2021c).

Despite agriculture's declining prominence as a contributor to GDP, food production in Bangladesh has quadrupled over the last few decades in order to meet the ever-growing food demand due to the country's annual population growth of at least 3%. Agriculture must have been well diversified in order to feed the population. Figure 5.2 shows the dynamics of Bangladesh's agricultural sector by indices of major categories and activities, such as crops, livestock, and fisheries. The country's crop production is dominated by paddy, which has grown steadily over time. Crop production surpassed other activities until 2005, when all three activities surpassed the growth of 2004–2005. Interestingly, since 2018, fish production has surpassed crop and livestock production. This shows that Bangladesh has been able to keep up its production of crops (paddy), livestock, and fisheries despite the adverse effects of climate change.

Agricultural finance can play an important role in increasing the resilience of Bangladesh's agricultural sector. In Bangladesh, as in other developing countries, agricultural finance includes a number of financial instruments that can support agricultural productivity and employment generation. The financial instruments include credit and interest rate policies, as well as policies to stabilize food prices, subsidize fertilizers, diversify crop and non-crop production, and mitigate risks in agricultural production (FAO 2016).

Figure 5.2: Dynamics of Agricultural Activities in Bangladesh



Source: Authors' calculation from World Bank (2021c).

Government policies aim to meet the twin objectives of attaining food security and raising rural income and employment via agricultural/rural diversification. For example, the Government of Bangladesh's food procurement policy aims to stabilize food prices for both farmers and consumers. Stabilizing producers' prices helps ensure the profitability of growing crops, while stabilizing consumers' prices help ensure an affordable food supply and thus encourages consumption of and demand for agricultural products. The policy also helps to build and maintain public storage facilities, which promotes open market operations and can help ensure price stability in case of emergency.

The Government of Bangladesh has also liberalized food trade in order to facilitate imports and exports by private traders; this also helps to stabilize food prices and support agricultural diversification. For instance, under the trade liberalization policy, private entrepreneurs are allowed to import rice, wheat, and other food items and to export shrimp and other agricultural products. These policies promote food security and enhance agricultural productivity by providing incentives to farmers and the private sector.[6]

In order to support agricultural diversification and productivity, the government also provides subsidized fertilizer on a regular basis. These subsidies, which cover the import of urea and boost domestic production, are worth $1 billion annually and account for more than 2% of the government's total public expenditure. In practice, the program involves cash transfers to farmers through bank accounts to facilitate the purchase of fertilizers from fertilizer dealers. This policy has helped to promote reliable access to modern fertilizers at affordable prices, which in turn enhances farm productivity.

The government has also introduced a national crop policy aimed at diversifying crop production to include potatoes, pulses, oilseeds, vegetables, fruits, and spices. In addition, livestock and fisheries development programs aim to increase the production and consumption of meat and fish. These latter policies have helped increase exports of fish and fisheries products, increasing foreign exchanges and boosting economic growth.

[6] Sometimes the private sector fails to import food during an emergency to meet market shortages. For example, in 2017, when crops failed due to flooding and other weather events, the government imported rice from international markets to augment the domestic supply and sold food in the open market to stabilize prices and increase food availability.

Bangladesh is geographically vulnerable to extreme weather conditions and is one of the most disaster-affected countries in the world. In order to meet the growing demand for high-value foods such as fish, meats, and vegetables, Bangladesh needs more resilient agricultural systems to mitigate the adverse impacts of climate changes. In 2013, the Government of Bangladesh introduced weather-index insurance products, with funding from the Asian Development Bank, to help farmers avert weather-related risks and reduce shocks in income and consumption due to disasters triggered by natural hazards. According to a recent government report, the total allocation to climate change mitigation interventions stands at Tk24,226 crores ($2.4 billion) or 7.5% of the government budget for the fiscal year 2020–2021 (Government of Bangladesh 2020). Given the extent of the risks inherent in agriculture due to global warming and weather-related shocks, these efforts may be inadequate, so further public support may be necessary to cope with the challenges of disasters.

To boost the financial access in the agricultural sector, the Government of Bangladesh has been formulating an agricultural and rural credit policy. In the most recent version (fiscal year 2022–2023), the volume of agricultural credit has been raised by 8.9% to Tk309 billion (Bangladesh Bank 2022). In the previous fiscal year, the credit supported 3.3 million people, of which more than half were women. In addition, separate credit schemes supported 2.5 million small and marginal farmers nationwide, and over 4,000 farmers from *char* (floodplain sediment islands), *haor* (wetland ecosystems), and less developed areas of the country. To support the national agricultural policy, Bangladesh Bank publishes an agricultural credit policy every year. Since 2011–2012, Bangladesh Bank has asked all commercial banks to disburse at least 2% of their loan portfolio in the agricultural sector.[7] Although agricultural credit policy sets different targets for different agricultural subsectors, the crop sector has been the highest priority, accounting for roughly 60% of the total disbursement target. Due to a lack of geographic coverage by commercial banks, meeting these agricultural lending targets has not always been possible. Bangladesh Bank has therefore allowed commercial banks to meet their targets by lending funds to MFIs with better outreach and repayment mechanisms.

[7] Agricultural credit policy covers all subsectors of agriculture including crops, livestock, and fisheries (see Bangladesh Bank [2017] for details).

Bangladesh Bank also has a policy to keep interest rates low for agricultural lending. According to the bank's directives, commercial banks fix their own interest rates for agricultural credit, and Bangladesh Bank's Agricultural and Rural Credit Policy and Program sets a maximum limit on agricultural interest rates at 13%. This limit has changed over time. Effective from April 2021, the agricultural lending rate of commercial banks was set at 8%. In contrast, MFIs are allowed to charge up to 27% interest on lending to both agricultural and nonagricultural sectors. This interest differential may have reduced the incentives for commercial banks to lend directly in the agriculture sector. Moreover, private commercial banks do not always follow Bangladesh Bank directives on agricultural loans.[8]

In general, MFIs are not mandated to lend to agriculture. Historically, the country's extensive lending network, developed since the early 1990s, has tended to target the landless poor and marginal farmers in order to promote self-employment in the rural nonfarm sector and to reduce poverty and unemployment. With donor support, the MFIs have been thriving by supporting rural nonfarm employment and poverty reduction in Bangladesh (e.g., Khandker 1998; Khandker and Samad 2014). As unemployment or underemployment in the agricultural wage market remains a major concern in the country, provision of credit to this segment of the population to initiate income-generating activities can be a major boost for agricultural growth.

The past two decades have witnessed the gradual entry of MFIs into the credit market and the relaxation of the enforcement of traditional eligibility conditions (e.g., ownership of less than half an acre of land). These trends have made it possible for marginal, small, and medium landholding farmers to have better access to microfinance (Khandker, Khalily, and Samad 2016). Lending to smallholders in agriculture is handled by microfinance agencies such as Grameen Bank, Association for Social Advancement (ASA), and BRAC.

[8] Bangladesh Bank has a provision that allows private banks to disburse at least 30% of their farm loans through their own channels and the rest through other channels. However, private banks do not always meet the 30% threshold. Not only that; for disbursing farm loans through other channels, they often charge MFI interest rates.

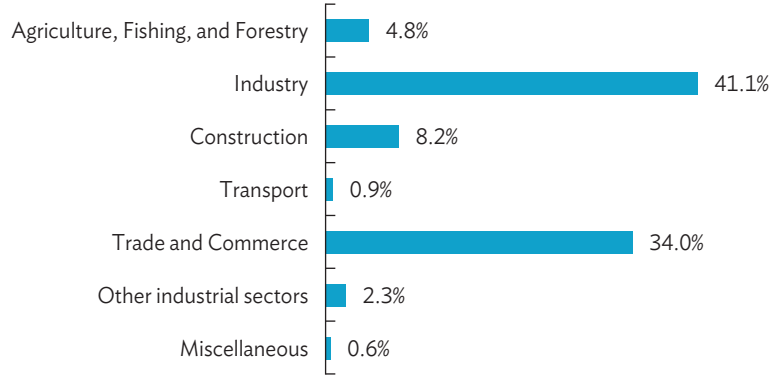
In cooperation with the Palli Karma-Sahayak Foundation (PKSF), Bangladesh's wholesale microfinance lending facility, the World Bank has also financed the Financial Services for the Poorest Project, a five-year effort initiated in June 2002. In 2007–2008, PKSF introduced the Seasonal Loans and Agricultural Lending Program, which helps MFIs to direct part of their lending toward crop agriculture.

5.3 Agricultural Lending

Banks have typically not widely targeted poor people or the agricultural sector; with banks' limited presence in rural areas, they have tended to finance well-to-do households with more collateral. However, since the 2000s, commercial banks have been gradually increasing their rural presence due to Bangladesh Bank's financial inclusion strategies, including new guidelines released in 2012 mandating that the number of rural bank branches must account for at least 50% of the total new branches to be opened in a given calendar year. During 2005–2010, growth in rural bank branches reached about 3.4%, which is not much lower than the 4.8% growth seen in urban areas; however, most banking activity in rural areas during this period was focused on savings rather than credit (Islam and Al Mamun 2011). With the Bangladesh Bank directive, commercial banks have also started working with the MFIs to reach smallholders in their effort to meet the target of 2% of lending to agriculture. Some commercial banks have also been forging partnerships with MFIs to provide better financing options for agricultural households. Bangladesh Krishi ("Agricultural") Bank, known as BKB, and Rajshahi Krishi Unnayan ("Development") Bank, known as RAKUB, are the main public agricultural banks focused exclusively on agricultural lending, although they have tended to focus on wealthy farmers with more collateral for bank loans.

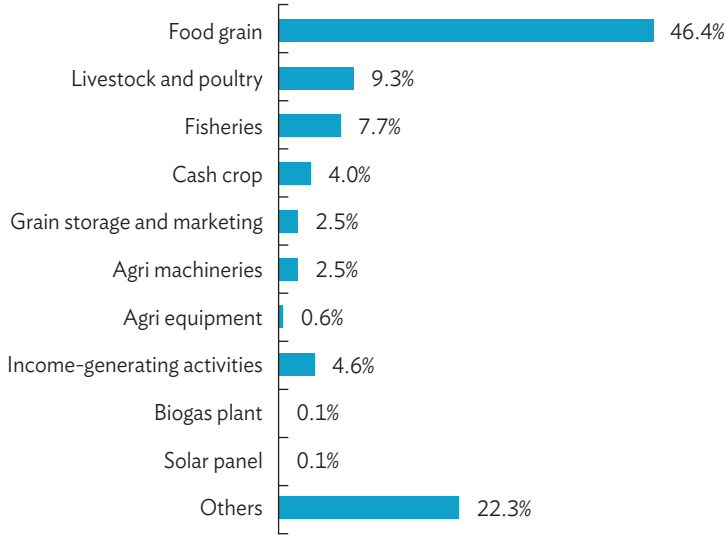
In the portfolio of bank lending, trade and industry loans are dominant, while agriculture loans accounted for some 5% of total lending in 2022 (Figure 5.3). In contrast, as Figure 5.4 shows, agriculture accounted for more than 70% of the two agricultural development banks' lending in 2012–2013. More specifically, food grain production received 46% of the lending by agricultural banks, while non-crop activity received 27% for the agricultural development banks.

Figure 5.3: Sector-Wise Distribution of Commercial Bank Loans, as of June 2022



Source: Bangladesh Bank (2022).

Figure 5.4: Sector-Wise Decomposition of Loans Outstanding, Bangladesh Krishi Bank and Rajshahi Krishi Unnayan Bank in Financial Years 2012–2013



Sources: BKB (2013) and RAKUB (2009–2013).

In fiscal year 2021–2022, total disbursement received was Tk12,099.0 billion from commercial banks and Tk671.2 billion from nonbank financial institutions (that is, a total of Tk12,770.2 billion) out of a total bank lending of Tk14,472.8 billion. Agriculture accounted for 2.4% of commercial bank lending (Table 5.1).[9]

Table 5.1: Agricultural Credit Disbursement in Bangladesh by Institution Type in 2021–2022 (Tk billion)

Institution Type	Total Amount	Agricultural Amount	Agricultural Percentage
Private commercial banks	9,109.3	163.2	1.5
Foreign commercial banks	638.5	8.1	1.3
State-owned commercial banks	2,133.0	29.3	1.3
BKB and RAKUB	218.2	87.7	28.1
a. Subtotal commercial banks	**12,099.0**	**288.3**	**2.4**
b. Nonbank financial institutions	**671.2**	**0.37**[a]	**...**
Grameen Bank	190.6	42.0[a]	N/A
BRAC	429.0	126.1	29.4
ASA	285.6	172.8	60.5
Other MFIs	797.4	132.8	16.6
c. Subtotal microfinance institutions	**1,702.6**	**...**	**...**
Grand total (a+b+c)	**14,472.8**	**...**	**...**

ASA = Association for Social Advancement, BKB = Bangladesh Krishi Bank, MFI = microfinance institution, RAKUB = Rajshahi Krishi Unnayan Bank.

Notes:

1. A few variables on agricultural lending cannot be found for fiscal year 2021–2022, and accordingly, aggregates cannot be calculated. Those fields are reported as N/A.
2. Actual share of agriculture may vary from the figures presented due to double counting, because MFIs collect about 12.8% of their revolving loan fund from commercial banks. Bank credit excludes foreign bill and interbank credit. Table presents information of fiscal year 2020–2021 ending in June.

[a] 2015 figure.

Sources: Bangladesh Bank (2021), Grameen Bank (2016), Microcredit Regulatory Authority (2021).

[9] The actual amount of agricultural lending is higher than Tk288.3 billion, as the lending from nonbank financial institutions and Grameen Bank during fiscal year 2021–2022 is not available.

5.3.1 Trends in Microfinance for Agriculture

MFIs in Bangladesh—the first of which started in the 1970s—have grown considerably in both scale and scope over the past few decades, particularly during the 1990s. That decade witnessed the entry of the Association for Social Advancement (ASA) and other major MFIs, as well as the increased availability of donor funding and the formation of PKSF in 1994. With the rapid establishment of new branches throughout rural Bangladesh, intensified disbursements, and expansion of service portfolios, microfinance operations grew at a phenomenal rate during this decade. Another entity, the Microcredit Regulatory Authority, as the regulator of the microfinance sector, has been working since 2006 to institutionalize microfinance operations in the country. As of June 2021, 880 MFIs have been approved by the Microcredit Regulatory Authority to operate in Bangladesh. In fiscal year 2021, 746 licensed MFIs have disbursed Tk1,680.98 billion to more than 33 million borrowers. The total savings of the microfinance sector stood at Tk414.35 billion at the end of June 2021.

Table 5.1 presents the distribution of MFI lending in agriculture vis-à-vis commercial and agricultural development banks in fiscal year 2021–2022. While lending to agriculture from commercial and agricultural development banks together accounted for only 2.4% of their total loan portfolio (Tk12,098.8 billion, equivalent to over $100 billion), MFI lending to agriculture accounted for 29% of their total lending (excluding Grameen Bank) (Tk1,512 billion or $15 billion) in fiscal year 2021–2022. More than 94% of MFI borrowers are women, suggesting that financial inclusion also supports social inclusion.

The agricultural sector has therefore remained largely self-financed or financed informally, highlighting the scope for institutional finance to take a bigger role in agriculture lending to spur agricultural diversification and commercialization.[10] It remains to be seen if the current issues with institutional finance in agriculture stem from an institutional failure to deliver customized products for agriculture, or from issues related to the demand side.

[10] Institutional finance may also include mobile money. While mobile money banking helps smooth consumption and thus improves household welfare (Jack and Suri 2014), it is not clear whether mobile money helps mitigate production risk and therefore promotes private investment in agriculture.

By June 2021, Grameen Bank, BRAC, ASA, and other MFIs had reached more than 33 million borrowers in Bangladesh (6 million for Grameen Bank and 27 million for other MFIs). At that time, MFIs' outstanding balance was Tk583.7 billion, of which Tk132.9 billion was for Grameen Bank and Tk450.8 billion was for other MFIs.

Palli Karma-Sahayak Foundation (PKSF), Bangladesh's wholesale microfinance lending facility, has orchestrated microfinance penetration through a wide network of small but highly competitive partner organizations. As Table 5.2 shows, PKSF's total volume of on-lending to partner organizations was Tk30.4 billion for agricultural loans in 2020–2021, out of a total of nearly Tk380 billion, thus accounting for 8% of the PKSF portfolio (Table 5.2).

Table 5.2: Distribution of Agricultural Loans by Palli Karma Shahayak Foundation, Fiscal Years 2011–2012 to 2020–2021

Fiscal Year	Item	Agricultural	Total	Percentage
2011–2012	Disbursement (in billion taka)	16.0	135.2	11.8
	Loan outstanding (in billion taka)	8.5	69.0	12.4
	No. of borrowers ('000)	552.9	6,651.3	8.3
2012–2013	Disbursement (in billion taka)	21.5	163.2	13.2
	Loan outstanding (in billion taka)	10.5	91.2	11.5
	No. of borrowers ('000)	668.2	7,865.8	8.5
2013–2014	Disbursement (in billion taka)	25.0	184.6	13.6
	Loan outstanding (in billion taka)	12.3	105.0	11.8
	No. of borrowers ('000)	822.6	8,131.3	10.1
2014–2015	Disbursement (in billion taka)	28.0	223.4	12.5
	Loan outstanding (in billion taka)	14.4	130.8	11.0
	No. of borrowers ('000)	882.8	8,547.2	10.3
2015–2016	Disbursement (in billion taka)	36.1	282.1	12.8
	Loan outstanding (in billion taka)	17.2	162.7	10.6
	No. of borrowers ('000)	988.1	9,389.0	10.5
2016–2017	Disbursement (in billion taka)	40.8	361.1	11.3
	Loan outstanding (in billion taka)	21.8	210.8	10.4
	No. of borrowers ('000)	1,010.0	9,967.5	10.1

continued on next page

Table 5.2: ***Continued***

Fiscal Year	Item	Agricultural	Total	Percentage
2017–2018	Disbursement (in billion taka)	47.0	447.9	10.5
	Loan outstanding (in billion taka)	22.6	250.6	9.0
	No. of borrowers ('000)	1,036.2	10,380.0	9.8
2018–2019	Disbursement (in billion taka)	44.4	511.6	8.7
	Loan outstanding (in billion taka)	24.1	298.2	8.1
	No. of borrowers ('000)	883.0	10,780.0	8.2
2019–2020	Disbursement (in billion taka)	46.5	471.6	9.9
	Loan outstanding (in billion taka)	26.7	338.9	7.9
	No. of borrowers ('000)	911.5	10,950.0	8.3
2020–2021	Disbursement (in billion taka)	58.3	570.1	10.2
	Loan outstanding (in billion taka)	30.4	378.0	8.0
	No. of borrowers ('000)	963.0	11,729.7	8.2

Notes: Here we define agricultural loan as ones that are disbursed under the Sufolon project. Fiscal years end in June, unless otherwise noted.

Source: Palli Karma-Sahayak Foundation annual reports, various issues.

In the portfolio of MFI lending to microenterprises, trade loans are dominant in 2016–2017, while agriculture loans have the highest share in 2020–2021 (Table 5.3). The share of agriculture in total disbursement accounted for some 23% of total lending in 2016–2017 and 33% in 2020–2021. In contrast, the share of trade dropped from 47% to 26% between the two periods.

Table 5.3: Sector-Wise Distribution of Microenterprise Loans, 2016–2017 and 2020–2021 (Tk million)

Year	2016–2017		2020–2021	
Type of Microenterprise	Loan Outstanding	% of total	Disbursement	% of total
Trade and business	170,097	46.7	139,183	25.9
Agriculture[a]	79,332	22.6	178,195	33.1
Cottage industries, handicrafts and pottery	12,089	3.3	25,111	4.7

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Table 5.3: ***Continued***

Year	2016–2017		2020–2021	
Type of Microenterprise	Loan Outstanding	% of total	Disbursement	% of total
Transportation	9,139	2.5	15,458	2.9
Social sector[b]	2.365	0.7	4,046	0.8
Others[c]	88,076	24.2	175,666	32.7
Total	361,097	100.0	537,658	100.0

MFI = microfinance institution.

Note: Samples include 247 and 491 MFIs, respectively.

[a] All crops, water irrigation, livestock, dairy, poultry, fish cultivation, etc.

[b] Health, medication, education, infrastructure, etc.

[c] Housing, food, computer, internet, solar, etc.

Source: CDF (2017, 2021).

5.3.2 Savings Mobilization

In addition to credit disbursement by financial institutions, agricultural finance also means savings mobilization to support lending.[11] The Government of Bangladesh's agricultural credit policy has often been geared toward extending government funds for credit. However, a sustainable financial system to support agriculture must also focus on using mobilized funds under deposit schemes. Just like commercial banks, agricultural financial institutions must be supported by savings mobilization in order to ensure responsible and sustainable financing for agriculture. Savings mobilization should thus be a critical dimension of the financial services provided by agricultural development banks.

The differentials between lending and deposit rates provide a margin for the profitability of financial institutions. Unlike commercial banks and agricultural development banks, most of the MFIs in Bangladesh (with the exception of Grameen Bank) are not legally bound to mobilize savings from public at large.

[11] Agricultural finance also includes other services such as payments (e.g., remittances) and insurance. However, we do not discuss these services in this chapter due to a lack of data on these dimensions of agricultural finance.

Rather, it is a standard practice for most MFIs to mobilize savings on a compulsory basis as part of their lending services. This is to protect loans against default; hence, savings can be treated as financial collateral (as opposed to physical collateral in the case of commercial and agricultural development banks or group collateral in the case of Grameen Bank, which views groups as a mechanism to safeguard loans against default when it is not feasible to require physical collateral). While savings mobilization must be an integral part of lending, keeping a safe margin between lending and savings can help cover the cost of lending, including default cost.

Tables 5.4a and 5.4b present the lending and deposit rates of agricultural development banks, while Table 5.5 presents those of MFIs. If we compare the lending–savings margins among state-owned agricultural development banks and MFIs including Grameen Bank, we find that the margin is the lowest for agricultural banks and highest for a few MFIs. For example, Grameen Bank charges 19% against a loan in 2015, compared to the 8% it provides against deposits that it mobilizes. On the other hand, BKB charges 8% against lending and provides 3.5%–7.0% for deposits. In contrast, an MFI such as BRAC charges 24% for lending and 7% against the compulsory savings it mobilizes from borrowers.[12]

Table 5.4a: Efficiency of Rajshahi Krishi Unnayan Bank

Fiscal Year (June)	2006–2007	2007–2008	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013
Total borrower	189,401	204,211	214,712	203,892	200,257	196,068	199,642
Deposit in million Tk	13,789	15,390	17,154	20,673	19,464	19,534	22,286
Loans outstanding in million Tk	25,906	27,112	29,194	33,522	35,594	38,360	41,720
Deposits/loans outstanding (%)	53	57	59	62	55	51	53
Deposit rate (%)	...	...	...	5.8	6.8	6.5	6.4
Lending interest rate (%)	7.1	6.9	6.5	7.2	7.4	8.1	8.4

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[12] Note that the Microcredit Regulatory Authority, a government agency at the Bangladesh Bank, regulates the lending rates of MFIs. It set a cap on the lending rate at 27% for MFIs registered with the authority.

Table 5.4a: ***Continued***

Fiscal Year (June)	2006–2007	2007–2008	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013
Cost per loan (%)	8.7	9.2	9.0	8.6	9.8	9.7	9.5
Profit (loss) in million Tk	−416.3	−640.9	−582.9	−247.8	−703.4	−676.4	−588.2
Bad debt provision in million Tk	0.80	0.81	0.74	3.32	12.68	35.91	5.55
Break-even interest rate (%)	7.98	8.26	7.87	8.41	9.10	9.43	9.13
Operational self-sufficiency (%)	...	...	...	102	86	90	93

MFI = microfinance institution, RAKUB = Rajshahi Krishi Unnayan Bank, Tk = taka.

Notes:

1. We used deposit instead of member because the definition of member may not coincide with that of MFIs as RAKUB is a specialized bank. Deposit rates are shown in RAKUB's five years' compliance report.
2. Cost per loan equals operating cost as % of loans outstanding.
3. Break-even interest rate per unit of principal lent is $r = (i + \alpha + \rho)/(1 - \rho)$, where i equals the cost of raising loanable funds per unit of principal lent, α is the expected cost of administering and supervising a loan per unit of principal lent, and ρ is the expected financial loss per unit of principal lent or simply the loan default rate. Operational self-sufficiency equals operating income/total operating expense.

Source: RAKUB (2009–2013).

Table 5.4b: Efficiency of Bangladesh Krishi Bank

Fiscal Year (June)	2010–2011	2011–2012	2013–2014	2014–2015
Total borrower	848,434	839,958	885,179	861,154
Deposit in million Tk	129,605	144,683	178,006	198,912
Loans outstanding in million Tk	139,491	149,296	173,182	179,960
Deposits/loans outstanding (%)	93	97	103	111
Deposit rate (%)	...	...	3.5–7.0	3.5–7.0
Lending interest rate (%)	7.2	8.4	8.4	8.2
Cost per loan (%)	9.9	10.9	12.1	11.5

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Table 5.4b: ***Continued***

Fiscal Year (June)	2010–2011	2011–2012	2013–2014	2014–2015
Profit (loss) in million Tk	–154.3	–140.4	–29,910.5	–2,152.5
Bad debt provision in million Tk	2,231	1,935	2,189	2,020
Break-even interest rate (%)	11.21	12.14	21.70	20.41
Operational self-sufficiency (%)	..	..	20%	30%

MFI = microfinance institution, Tk = taka.

Notes:

1. We used deposit instead of member because the definition of member may not coincide with that of MFIs as BKB is a specialized bank. Deposit rates reported here are only rough estimates as shown in the respective website since saving products are heterogeneous. Operational self-sufficiency equals operating income/total operating expense.
2. Cost per loan equals operating cost as % of loans outstanding.
3. Break-even interest rate per unit of principal lent is $r = (i + \alpha + \rho)/(1 - \rho)$, where i equals the cost of raising loanable funds per unit of principal lent, α is the expected cost of administering and supervising a loan per unit of principal lent, and ρ is the expected financial loss per unit of principal lent or simply the loan default rate.

Source: BKB (2012, 2015).

Table 5.5: Indicators of Efficiency of Bangladeshi Microfinance Institutions

	ASA		BRAC		Grameen Bank		Other MFIs Average		Overall Average	
Indicators (average)	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
Active borrowers (million)	5.36	6.79	4.92	5.74	7.18	8.93	1.6	3.4	9.2	11.7
Women borrowers (%)	91.6	91.3	87.4	87.0	_	96.7	96.0	99.3	94.6	95.8
Assets (billion $)	1.468	2.240	2.108	2.233	2.7	2.804	0.04	0.08	0.2	0.3
Loan outstanding (billion $)	1.129	1.919	1.437	2.027	1.295	1.769	0.04	0.07	0.1	0.2
Mean loan/borrower ($)	210	282	292	353	180	198	224	299	224	297
Mean loan/GNI/cap (%)	20.8	28.0	28.9	35.0	17.9	19.6	22.2	29.6	22.2	29.4
Deposits/loans (%)	42.5	43.1	35.9	35.7	193.5	146.0	39.3	36.0	43.5	39.7
Deposits rate (%)	6–12	_	~7	_	8–12	_	_	_	_	_
Lending rate (%)	24	21	24	23	19	18	20	20	21	20

continued on next page

Table 5.5: ***Continued***

Indicators (average)	ASA		BRAC		Grameen Bank		Other MFIs Average		Overall Average	
	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
Net return (% of assets)	9.96	9.73	9.87	1.23	−0.1	1.0	2.6	3.4	3	3.7
Financial revenue (% of assets)	18.2	18.8	16.3	22.3	13.8	15.4	19.0	18.9	16.3	18.6
Financial expense (% of assets)	2.7	3.3	4.9	13.7	8.0	6.9	4.8	4.9	4.8	5.2
Operating expense (% of assets)	6.6	6.3	7.4	8.3	5.1	6.3	11.1	11.0	10.7	10.2
Break-even rate (%)	7.9	6.7	7.7	8.7	10.0	10.0	11.0	10.2	9.1	8.9

ASA = Association for Social Advancement, GNI = gross national income, MFI = microfinance institution.

Notes:

1. "_" means information was not submitted to MIX. Figures above are average numbers. Since MIX Market accepts voluntarily submitted data, total figures would be misleading. In this case, averages are more representative. Fiscal year ends in June, unless otherwise noted. $1 = Tk81.
2. Lending interest rate equals amount of interest collected as percentage of loans outstanding.

Source: Microfinance Information Exchange (MIX) 2018.

Mobilized savings must support the lending of any financial institution in order to create financial discipline. The higher its percentage of savings against the loans outstanding, the less the financial institution depends on donor funds. If we compare the ratios (deposit as a percentage of loans outstanding; see Tables 5.4 and 5.5), we find that this ratio is highest for Grameen Bank and lowest for agricultural development banks such as RAKUB. The deposit/loan ratio is more than 100% for Grameen Bank, meaning that it mobilizes more savings than it lends. On the other hand, the deposit/loan outstanding rate is much lower than 100% for agricultural development banks (for RAKUB, it was 53% in 2012–2013), meaning they use government money to support agricultural lending. Thus, government-supported agricultural lending is not sustainable.

5.3.3 Is Agricultural Lending Cost-Effective?

This leads us to the core question of the financial self-sustainability of agricultural lending agencies. Is institutional financing cost-effective for agricultural loans? Cost efficiency is a measure of an organization's performance in managing its operations. The most common measure of efficiency, the operational efficiency, is defined by operating expenses as a percentage of average gross loan portfolio or total assets.[13]

A second way to measure efficiency is by assessing an organization's financial efficiency, determined by whether the cost per unit of the principal lent is equal to the rate of interest charged to the borrowers. This means that to meet the financial efficiency criterion, a program should charge an interest rate that generates a revenue equal to or greater than the cost per unit of the principal. This is called the break-even interest rate, expressed by the following equation:

$$r \geq (i + \alpha + \rho)/(1 - \rho), \quad (1)$$

where r equals the interest rate charged per unit of principal lent, i equals the cost of raising loanable funds per unit of principal lent, α is the expected cost of administering and supervising a loan per unit of principal lent, and ρ is the expected financial loss per unit of principal lent, or simply the loan default rate.

Let us consider the cost-efficiency of agricultural development banks (BKB and RAKUB) vis-à-vis that of MFIs. Table 5.4 presents the cost-efficiency and other indicators of agricultural development banks (BKB and RAKUB) for the period of 2010–2011 to 2014–2015. For RAKUB, the loans outstanding amount ranges between Tk2.5 billion and Tk4.2 billion, half of which is supported through the deposits mobilized. This means that half of the loans outstanding come from the government and other sources. On the other hand, BKB seems to lend the deposits that it mobilizes, as its deposit/loan outstanding rate is close to 100% over the study period (2013–2015). However, none of these agricultural development banks is cost-efficient, meaning that they cannot recover their operating costs. Both banks are running at huge losses and are sustained by government money.

[13] Operational efficiency can be measured in various ways, including by determining whether an organization operates at the lowest cost of inputs for a given quantity of output. The Consultative Group to Assist the Poor, a consortium of 28 development agencies that support microfinance, provides five indicators for measuring the efficiency and productivity of MFIs (Rosenberg 2009).

Table 5.5 presents the break-even interest rate and other relevant indicators of financial efficiency for MFIs for two years (2015 and 2017). It appears that the scale of operations is an important factor for determining the extent of an organization's financial efficiency. Grameen Bank, established in 1983 as a specialized bank for microfinance operations, is one of the largest MFIs in Bangladesh, measured by the number of borrowers as well as loans outstanding. In 2017, Grameen Bank had almost 9 million borrowers, compared to BRAC's 5.7 million. The respective loans outstanding were $1.77 billion and $2.03 billion. In terms of cost efficiency (defined by operating cost as a percentage of loans outstanding), all of the MFIs appear to be cost-effective when lending rate is considered. However, in terms of the break-even rate (defined by the total cost as percentage of loans outstanding), none of the MFIs, including Grameen Bank, was efficient in 2015 or 2017 (because the break-even rate is lower than the average lending rate). Thus, although the MFIs managed to cover their operating costs, they failed to recover the full cost of operation during those two periods. Of course, this does not mean they always remain cost-ineffective. However, operating expenses are found to be lower for Grameen Bank compared to ASA and BRAC. Moreover, Grameen Bank has a greater break-even interest rate than ASA and BRAC, possibly due to high financial expenses and provision for bad loans. On the other hand, the larger MFIs such as Grameen Bank, BRAC, and ASA have lower break-even rate compared to the rest of the MFIs, resulting from their large-scale operation.

Another way to assess the cost-efficiency of MFIs is the so-called operational self-sufficiency (OSS). The OSS, defined by CGAP as the operational income as a percentage of total operational cost (financial expenses plus operating cost and provision for bad loans), varies by program, with a percentage higher than 100 indicating that a program is operationally self-sufficient. According to this measure, ASA is the most operationally efficient MFI in Bangladesh. ASA also stands out for lending more money to agriculture than any other MFI in Bangladesh, including Grameen Bank. In contrast, as per the OSS measure, BKB is the worst performing institution in terms of agricultural lending; BKB's OSS was 30% in 2014–2015, meaning that the state-owned agricultural development bank is carrying huge losses due to bad debts and high operating costs.

One critical factor underlying the differences in the performance of agricultural development banks and MFIs is that the government determines the lending rate for agricultural development banks; at 9%, the rate is much lower than the average MFI lending rate (21%). Another critical factor in the poor performance of BKB and RAKUB is these institutions' huge bad debt provision, a result of the government's loan forgiveness policy for farm loans. As such, these banks use government money for loans but do not have incentives to recover such loans. Thus, the government's loan forgiveness policy, which forgives farm loans in the case of crop losses due to disasters triggered by natural hazards or climate change, must be weighed against the sustainability of the financial services available to farmers.

5.3.4 Digitization of Agricultural Finance and the Pandemic

In a developing country such as Bangladesh, where only 53% of the adults (age 15+) have an account with financial institutions (World Bank 2021b), digital financial services (DFS) can make a difference. The most prominent form of DFS in Bangladesh is mobile financial services (MFS), the real beneficiaries of which are the disadvantaged population and those living in rural areas. MFS can provide secured and fast financial services at a low cost. In addition, MFS give transparency to transactions, which reduces the possibility of fraud and contributes to the government's tax revenue. By now, MFS in Bangladesh have over 180 million registered accounts (60 million active), facilitating a range of transactions (such as cash-ins, cash-outs, and transfers) amounting to over Tk29 billion a day (Bangladesh Bank 2022).

MFS were also instrumental to disbursing government transfer payments to millions of beneficiaries during the coronavirus disease (COVID-19) pandemic. When the COVID-19 pandemic hit, Bangladesh's government rolled out emergency stimulus packages at different phases for vulnerable populations in informal sectors, export-oriented industries, medium-sized and cottage industries, and farm sectors. While the government had been slowly digitizing its social protection programs even before the pandemic, it mandated digital payments for the first time during the pandemic. About 3 million new MFS accounts were opened in April 2020 alone to help disburse funds to export-oriented industries. The beneficiary registration program using the National Identity Card helped the government's effort to bring all recipients of safety-net programs under the government-to-person scheme with MFS.

For farmers, there was a refinancing program amounting to Tk50 billion. In fiscal year 2021, the Government of Bangladesh disbursed about Tk60 billion through MFS and agent banking (*The Business Standard* 2021). Apart from the government initiatives, nongovernment organizations also came forward to assist vulnerable populations through DFS. BRAC, for example, reached over 600,000 vulnerable families during the pandemic through its digital cash transfer program, which used bKash to transfer money (BRAC 2020). Among the beneficiaries, 14% were farmers.[14]

During the pandemic lockdown, use of MFS was on the rise. Based on Bangladesh Bank statistics, the registered MFS accounts increased 21% during March 2020–December 2020, which was the height of the pandemic. In contrast, the growth rate of MFS accounts was 16% during the same period of the previous year. Similarly, the country also experienced an explosion in e-commerce transactions during the pandemic—online sales rose by 70%–80% in July–September 2020 (Sahoo, Hossain, and Hassan 2020).

The obvious advantages of MFS transactions, such as convenience, speed, and transparency, have led to longer-term socioeconomic benefits for the users of MFS in Bangladesh. A 2020 study finds consumption- and income-smoothening impacts for bKash during periods of shocks (Murshid et al. 2020). For example, for bKash users, domestic remittances increased by almost 100% for households exposed to health shocks, and consumption increased by 8.5% for those exposed to health shocks. Moreover, bKash users subject to unexpected shocks saw their incomes rise by 41.7% compared to nonusers of bKash. There are other social benefits too for MFS users. Households' education expenses went up by as much as 48% as a result of MFS transactions. MFS use also enhances women's empowerment. The same study finds that use of MFS increases the probability of women's freedom to move by 3.7 percentage points and their decision-making on household economic issues by 29 percentage points. A more recent study carried out by the Asian Development Bank (2022) finds that the use of MFS by microfinance members that are not engaged in microenterprise activities raises their nonfarm income by 1% and total income by 0.2%.

[14] bKash is the most prominent MFS in Bangladesh.

5.4 Agriculture Finance: Status at the Household Level

Farmers' access to institutional finance may be defined by the percentage of farmers with an account with a financial institution, which is a crude measure of financial inclusion for agriculture.[15] A broader indicator of financial inclusion is a measure of individual access to and use of financial services to save, borrow, make payments, and manage risks in production and consumption (Demirguc-Kunt and Klapper 2012; Demirguc-Kunt et al. 2015). The Universal Financial Access initiative of the World Bank stresses the need for every individual to have an account with a financial institution (Demirguc-Kunt and Klapper 2012; World Bank 2017).[16] Globally, 71% of adults were reported as having an account with a financial system in 2021, compared to 61% in 2017 according to the World Bank's Global Financial Inclusion (Findex) data. There is almost universal financial inclusion in high-income countries (95.6%), but coverage remains limited in developing countries (59.2%) and varies by the country's level of financial and economic development.

Financial inclusion among farmers (those who have received income from agriculture over the last 12 months) in the developing world was 57.1% in 2021, compared to 62.2% for the nonfarmers (Table 5.6). Following this definition, we find that in Bangladesh in 2021, 69.7% of farmers had an account with a financial institution, compared to 49.3% for nonfarmers.

[15] The data used for this discussion of financial inclusion comes from the World Bank's Global Financial Inclusion (Findex) data of 2021. Farmers are defined as those who sell some or all of their agricultural output in the market and are in the middle of the landholding distribution. Subsistence farmers, who consume most of what they produce, are thus not included. Sampling weights are used to make the averages representative at the country level. According to this definition, we find that 17.2% of the individuals in Bangladesh were reported to be farmers, compared to 8.6% in India and 13.1% for the developing world (see Table 5.6). This percentage, even though weighted, seems an underestimate of the farming community. This is because the definition excludes those subsistence farmers who did not undertake any cash transaction over the last 12 months during the survey carried out by the World Bank in 2021.

[16] As per the Findex, a financial account is defined as an account at a bank or another type of financial institution, such as a credit union, cooperative, or microfinance institution. Financial account also includes a mobile money account, which is limited to services that can be used without an account at a financial institution. In the Findex data, the mobile money account is defined by whether the individual had used a mobile phone to pay bills or to send or receive money in the last 12 months.

Table 5.6: Financial Inclusion for Agriculture: Bangladesh, India, and Developing World, 2021 (%)

Income Profile	Farmers (9.8%)					Nonfarmers (91.2%)				
	Has account	Borrowed	Formal borrowing	Borrowed for ag/bus[a]	Obs.	Has account	Borrowed	Formal borrowing	Borrowed for ag/bus	Obs.
Poorest	58.7	61.0	19.9	7.9	33 (55)	40.9	43.7	12.7	6.0	160 (125)
	63.4	56.8	13.0	8.2	42 (50)	49.8	49.1	15.1	5.8	159 (142)
Middle	72.2	50.9	7.5	13.6	31 (53)	55.8	44.8	13.9	3.6	178 (143)
	86.1	58.4	22.5	13.7	34 (46)	56.6	47.3	10.3	2.1	172 (154)
Richest	74.0	70.1	39.9	13.7	23 (40)	43.0	32.7	11.8	3.1	168 (192)
Bangladesh total	69.7	59.4	20.0	11.1	163 (244)	49.3	43.4	12.7	4.1	837 (756)
India total	88.0	58.8	16.3	14.6	275 (421)	76.5	43.5	8.9	5.7	2,725 (2,579)
Developing world total	57.1	60.5	14.0	18.4	11,411 (17,560)	62.2	46.9	10.6	5.5	80,849 (102,297)

Notes:

1. "Farmers" are defined as those who "received agricultural payments in the past 12 months" (weighted sample).
2. "Developing World" includes all developing countries except the OECD countries.
3. Farmers constitute 8.6% of the population in India and 13.1% in the developing world.

[a] The variable "Borrowed for agriculture/business" is not available in 2021 database; so, 2017 figures are used instead. Figures in parentheses are observations from 2017 database.

Source: Findex database 2017 (Demirguc-Kunt et al. 2018) and 2021 (Demirguc-Kunt et al. 2022).

In contrast, in India, 88.0% of farmers had an account with a financial institution, compared to 76.5% of nonfarmers. Thus, financial inclusion among farmers in Bangladesh is lower than that of India and the developing world.[17]

[17] Income matters for the status of financial account among farmers; income is slightly higher among the highest income group, as are the chances of borrowing from formal sources. Thus, 74% of farmers in the highest income group have a financial account, compared to 58.7% in the lowest income group. Similarly, 39.9% of the farmers in highest income group borrowed from formal source, compared to 19.9% in the lowest income group.

Financial inclusion for agriculture can imply agricultural financing, which includes financial services such as credit, savings, payments, and insurance. One of the important aspects of agricultural finance/financial inclusion for agriculture is credit. The Findex data provides information on the extent of access to institutional credit among farmers and nonfarmers. As shown in Table 5.6, in 2021, 59.4% of the farmers in Bangladesh were reported to have borrowed money, compared to 58.8% in India and 60.5% in the developing world. More importantly, an overwhelming percentage of farmers in the developing countries, including Bangladesh and India, rely on informal sources of credit. Among the farmers in Bangladesh, only 20% borrowed from formal or institutional (i.e., banks, MFIs, and mobile account) sources, compared to 16% in India and 14% in the developing world. Reliance on informal sources of credit also shows among nonfarmers—13% of nonfarmers borrowed from informal sources in Bangladesh in 2021, compared to 9% in India and 11% in the developing world. This could imply that the transaction costs of borrowing or lending from formal sources are high in these countries.

As Table 5.6 shows, among farmers in Bangladesh, only 11.1% borrowed for productive activities such as agriculture and business. The corresponding percentage is 14.6% in India and 18.4% in the developing world. This means that probably only a small percentage of borrowed money goes to support production activities such as agriculture, while a large share goes to support nonproduction activities such as consumption or health. This could be due to the fact that informal sources charge interest rates higher than the rates of formal financial institutions, including MFIs.

Two issues thus emerge from this financial inclusion survey: (i) Farmers (as well as nonfarmers) borrow mostly from informal sources, perhaps due to credit rationing from formal institutions, and (ii) farmers tend to not use borrowed money for production purposes. Does this mean that farmers are not credit-constrained in agricultural decision-making? What does institutional lending, even if in small amounts, mean for agricultural income and productivity? Unfortunately, the Findex data does not provide enough information to address these questions. Still, these factors are important for policymakers to determine whether enhanced institutional access to financial services would increase agricultural productivity to meet the goals of achieving sustainable growth and food security.

5.4.1 Effects of Borrowing on Household Income and Productivity

The household survey used to discuss these demand-side issues comes from the Bangladesh Rural Microcredit Survey, which was conducted by the Bangladesh Institute of Development Studies and the Institute for Microfinance, in partnership with the World Bank. This is a household-level panel survey that covers 1,500 rural households across 105 villages in 1991–1992, 1998–1999, and 2010–2011 (for details, see Khandker, Khalily, and Samad 2016). However, for various borrowing purposes, particularly for borrowing for agricultural activities, the 1991–1992 data are not compatible with the data from the other two rounds and thus were not used in the analysis.

During 1998/1999–2010/2011, microfinance accounted for more than 90% of the improvement in access to institutional finance in Bangladesh, increasing from 38% in 1998–1999 to 56% in 2010–2011 (Table 5.7). During the same period, access to formal finance stayed relatively stable—7% in 1998–1999 compared to almost 8% in 2010–2011.[18] However, the share of formal loans was higher among microfinance nonparticipants than among participants; in 2010–2011, the share of formal finance was 26% for people who did not participate in microfinance programs, compared to 5.9% for those who did (Table 5.7).[19]

Over the 12-year period examined in the survey, access to informal finance also increased substantially (from 23% in 1998–1999 to 57% in 2010–2011; see Table 5.7). The bulk of informal finance was directed to meeting the needs of households that did not participate in microfinance (Table 5.7).

Interestingly, among households participating in microfinance, the demand for informal finance increased over the period (from over 17% in 1998/1999 to about 63% in 2010/2011), as did the demand for institutional finance. However, microfinance represented a much larger share of lending volume, accounting for 65% of the total borrowing by members of microfinance in 2010–2011 (versus 29% for informal finance).

[18] Formal finance includes loans from commercial banks and agricultural banks.

[19] Note that nonparticipants also include households that are well-off and hence can access formal finance.

Table 5.7: Incidence of Borrowing from Alternate Sources and Share in Total Loans (%)

Borrowing Source	Members of Microfinance	Nonmembers of Microfinance	All Households
1998–1999 (N = 1,758)			
Microfinance	100.0 (91.4)		38.0 (67.2)
Formal source	5.6 (1.9)	8.3 (26.1)	7.3 (8.3)
Informal source	17.5 (6.7)	27.0 (73.9)	23.3 (24.5)
All sources	100.0	32.1	57.9
2010–2011 (N = 2,322)			
Microfinance	100.0 (65.2)		56.2 (47.6)
Formal source	7.1 (5.9)	8.8 (26.1)	7.8 (7.8)
Informal source	62.6 (28.9)	50.1 (73.9)	57.1 (44.6)
All sources	100.0	53.7	79.7

Notes: Figures in parentheses are shares of loan volume from a source in total loan volume from all sources. Formal source refers to credit from commercial banks and agricultural banks.

Sources: World Bank, Bangladesh Institute of Development Studies (2013) and WB–InM (2010/2011).

That said, informal finance has played a growing role among households participating in microfinance; while 17.5% of them borrowed from informal sources in 1998–1999, that percentage jumped to 62.6% in 2010–2011 (Table 5.7).

Several interesting loan-distribution patterns have emerged over the years. First, a significant share of loans has supported consumption—28% in 1998–1999 and 27% in 2010–2011 (Table 5.8). Second, over time, the farm sector has received an increased share of loans from all sources—from 28% in 1998–1999 to 33% by 2010–2011 (the change is statistically significant at the 1% level).

Table 5.8: Distribution of Main Purpose by Source of Borrowing (%)

Borrowing Source	Farm-Sector Activities	Non-Farm-Sector Activities	Personal Expenditure
1998–1999 (N = 1,758)			
Microfinance	27.5	51.8	20.7
Formal source	46.7	22.9	30.4
Informal source	26.8	22.8	50.4
All sources	28.2	43.4	27.8
2010–2011 (N = 2,322)			
Microfinance	39.8	56.5	3.7
Formal source	68.7	26.6	4.7
Informal source	15.6	10.2	74.1
All sources	33.0	39.9	27.1

Note: Formal source refers to credit from commercial banks and agricultural banks.

Sources: World Bank, Bangladesh Institute of Development Studies (2013) and WB–InM (2010/2011).

Formal financial services accounted for the bulk of the higher percentage of farm loans. The share of farm-sector loans from commercial banks increased from about 47% in 1998–1999 to about 69% in 2010–2011. Finally, although a large share of microfinance loans went to non-farm-sector activities, a higher percentage went to support farm-sector activities over time; 28% went to support farming in 1998–1999, but this reached nearly 40% in 2010–2011 (Table 5.8).

In addition, the share of loans for productive activities has gone up over time. In 1998–1999, 80% of microfinance loans went to productive activities (52% for nonfarm and 28% for farm activities); this rose to 97% in 2010–2011 (57% for nonfarm and 40% for farm activities; see Table 5.8).

We estimate the effects of credit from various sources on household outcomes, including income from farm and nonfarm sources. Following earlier work with the data, we estimate the credit effect by borrowers' gender from both MFIs and formal sources (commercial and agricultural development banks).

The outcomes (Y_i) (e.g., farm and nonfarm income), conditional on the level of credit demand (C_i), are expressed as follows:

$$Y_i = \beta_y X_i + \delta_f C_{if} + \delta_m C_{im} + \eta_i + \varepsilon_i, \quad (2)$$

where X is a vector of characteristics at the household level (e.g., sex, age, education of household head, and landholdings) and the village level (e.g., extent of village electrification and irrigation, availability of infrastructure, and price of consumer goods), β is a vector of unknown parameters to be estimated, δ_f and δ_m are the effects for female and male credit, respectively, η_i is the unmeasured determinant of the outcome, and ε_i is a nonsystematic error.

With cross-sectional data, endogeneity from nonrandom program placement in villages may be an issue, as well as households' self-selection into programs. In a cross-sectional analysis using data collected in 1991–1992, Pitt and Khandker (1998) used a village-level fixed-effects (FE) method to resolve program placement bias and a two-stage instrumental variable (IV) technique to resolve the endogeneity of a household's self-selection into credit programs. Using the panel data of two data points (1998–1999 and 2010–2011), equation (2) can be rewritten as follows:

$$Y_{it} = \beta_y X_{it} + \delta_f C_{ift} + \delta_m C_{imt} + \eta_{it} + \mu_i + \varepsilon_{it}, \quad (3)$$

where $t = \{1,2\}$ is the survey round, η_{it} is an unobserved determinant of the outcome that is time-variant, μ_i is an unobserved determinant of the outcome that is time-invariant, and ε_{it} is a non-systematic error, as previously defined. With the panel data, the household FE estimation technique can eliminate the time-invariant parameter (μ_i) by transforming equation (3) as follows:

$$Y_{it} - \overline{Y}_i = \beta_y (X_{it} - \overline{X}_i) + \delta_f (C_{ift} - \overline{C_{if}}) + \delta_m (C_{imt} - \overline{C_{im}}) \quad (4a)$$

$$+ (\eta_{it} - \overline{\eta}_i) + (\mu_i - \overline{\mu}) + (\varepsilon_{it} - \overline{\varepsilon}_i),$$

where the bar variables (e.g., Y_i, X_i, and $\overline{C_{if}}$) are average values for each household. Since μ is a constant, $\mu_i = \overline{\mu}$, and thus its effect is eliminated. Therefore, equation 4a can be written as follows:

$$\Delta Y_{it} = \beta_y \Delta X_{it} + \delta_f \Delta C_{ift} + \delta_m \Delta C_{imt} + \Delta \eta_{it} + \Delta \varepsilon_{it}. \quad (4b)$$

Since $\eta_{it} \neq \overline{\eta}_i$, the problem of unobserved effects cannot be disregarded completely; thus, the ordinary least squares (OLS) estimation of equation (4b) will be biased.

Our empirical strategy uses household-level weighted FE estimation with weights determined by propensity-score (p-score) matching, based on the participation equation to account for unobserved time-variant heterogeneity. This strategy is referred to as the p-score-weighted FE method and provides consistent estimates of the impacts (Hirano, Imbens, and Ridder 2003).[20]

Table 5.9 presents the estimates of credit effects of male and female borrowers of both sources of credit (formal and MFIs) using the p-score-weighted FE method. We consider the effects for two types of farm income (crop and non-crop), as well as for total farm income. We also show the effects on nonfarm income from all types of nonfarm enterprise activities.

As Table 5.9 suggests, we find no significant effect (either positive or negative) of men's microcredit borrowing on any type of farm income or on total farm income, suggesting that men's microcredit borrowing plays no role in farm income.[21] However, men's microcredit borrowing does have a significant effect on nonfarm income, indicating that men's borrowing matters more for nonfarm than for farm income. In contrast, men's borrowing from formal sources plays a role in raising non-crop farm income (from livestock, fisheries, and poultry), as well as nonfarm income. However, borrowing by men from microcredit institutions has a larger effect on nonfarm income than men's borrowing from formal sources. A 10% increase in men's borrowing from microcredit increases nonfarm income by 1.34% in the case of microcredit, while a 10% increase in men's borrowing from formal credit increases nonfarm income by 1.07%.

[20] This is also called inverse probability treatment weighting, in which weight is given by 1/p for households that are treated and 1/(1-p) for those not treated. An alternate implementation of propensity score creates matched observations of treated and untreated households and then applies FE on the matched sample (for an example, see Drichoutis et al. 2015). The idea behind this technique is that FE controls for time-invariant unobserved factors and matching balances treated and untreated units to control for time-varying unobserved factors (Angelucci and Attanasio 2013). While both p-weighting and matching can handle time-varying unobservables, weighting might be better than matching, as the latter can drop a good number of observations in matching process. There are other methods available to treat time-varying heterogeneity in panel data analysis (see, e.g., Khandker, Koolwal, and Samad [2010] for details).

[21] This finding seems plausible because men do not borrow much from microcredit sources. Table 5.9 shows that men's borrowing from formal sources has a positive effect on livestock income.

Table 5.9: Panel Estimates of the Impacts of Cumulative Amount of Borrowing on Household Income (P-score Weighted Household Fixed Effects) (N = 1,758)

Loan Variables	Income from Crop Production	Income from Livestock, Poultry, and Fishery	Total Farm Income	Total Nonfarm Enterprise Income
Log men's loans from microcredit (Tk)	−0.031 (−0.85)	−0.024 (−0.90)	−0.019 (−0.80)	0.134** (2.34)
Log women's loans from microcredit (Tk)	0.027** (2.37)	0.043** (2.32)	0.026* (1.78)	0.104** (4.03)
Log men's loans from formal sources (Tk)	−0.064 (−1.49)	0.038* (1.78)	−0.054 (−1.18)	0.107* (1.85)
Log women's loans from formal sources (Tk)	−0.032 (−0.73)	−0.039 (−0.37)	−0.005 (−0.07)	0.365 (1.51)
R^2	0.309	0.137	0.088	0.053

Notes: Outcomes are in log per capita Tk per month. Formal source refers to commercial banks and agricultural banks. Figures in parentheses are t-statistics based on standard errors clustered at the village level.

* and ** refer to a statistical significance of 10% and 5% or less. Regressions include more control variables at the household level (e.g., age, sex, and education of household head; log of land assets) and village level (e.g., price of consumer goods; male and female wages; infrastructure, including schools and electricity availability; and proportion of irrigated land).

Sources: World Bank, Bangladesh Institute of Development Studies (2013) and WB–InM (2010/2011).

On the other hand, female borrowing from microcredit matters for both crop and non-crop income, as well as for nonfarm income. Results show that a 10% increase in female borrowing from microcredit increases crop income by 0.27%, non-crop farm income by 0.43%, and total farm income by 0.26%. The same 10% increase in female borrowing from microcredit raises nonfarm income by 0.10%.

The findings suggest that microfinance seems to help nonfarm income more than farm income, especially for women. Formal finance, on the other hand, helps farm income and productivity more for male borrowers than for female borrowers.

5.4.2 Do Credit Constraints Affect Farmers' Income and Productivity?

The effects of male or female borrowing, estimated in the previous section, may be affected by the extent of supply-side constraints, determined primarily by the fact that the loans disbursed are less than the amount that borrowers request. Following Boucher, Guirkinger, and Trivelli (2009), borrowers were considered supply-side constrained if they reported not being able to borrow as much as they wanted or needed.[22] Borrowing constraints may prevent farmers from allocating resources efficiently and thus cause them to suffer from efficiency losses. Therefore, it is worth considering how supply-side factors driving demand for microfinance or formal finance may affect farm households' income and productivity.

Before turning to this issue, we would like to compare the pattern of such constraints among farmers who have borrowed from various MFIs and formal finance sources. Table 5.10 shows that supply constraints for both types of borrowers declined substantially overall, from more than 54% in 1998–1999 to only about 8% in 2010–2011. Interestingly, the percentage-point decline in supply-side constraints was higher in the case of borrowers from formal sources than for microfinance borrowers. More specifically, in the case of microfinance borrowers, supply-side constraints declined from 52% in 1998–1999 to 8% in 2010–2011, with a net decline of 44 percentage points over a 12-year period. In contrast, in the case of formal finance, supply-side constraints declined from 70% in 1998–1999 to 14% in 2010–2011, with a total decline of 56 percentage points over the same period.

In examining the role of supply constraints on farm income and productivity beyond the estimated effects of borrowing, we postulate that the outcome of equation (3) differs for constrained and unconstrained households. We can use borrowers' reported credit-constraint status as an additional variable in equation (3).[23] We can also interact this constraint with the amount that borrowing households received in order to determine whether the borrowing effect varied by the extent of constraint.

[22] Constraints are defined in a strict way in the sense that if a household has multiple loans and it is constrained in one loan only, the household is considered credit-constrained.

[23] We assume here that supply-side constraint is exogenously given to the households. We attempted to run an endogenous switching regression, but it did not converge.

Table 5.10: Share of Credit-Constrained Borrowers for Alternate Borrowing Sources by Farm Size (%)

Farm Size	Microfinance	Formal Source	Both Sources
1998–1999 (N = 903)			
Marginal	48.1 (N = 593)	53.7 (N = 39)	48.4 (N = 615)
Small and medium	57.8 (N = 214)	74.9 (N = 52)	59.2 (N = 242)
Large	76.2 (N = 24)	74.1 (N = 26)	72.8 (N = 46)
All farm sizes	51.8 (N = 831)	69.7 (N = 117)	53.6 (N = 903)
2010–2011 (N = 1,501)			
Marginal	7.0 (N = 1,167)	13.8 (N = 39)	7.1 (N = 1,191)
Small and medium	10.6 (N = 245)	14.9 (N = 69)	11.3 (N = 276)
Large	14.7 (N = 27)	12.9 (N = 16)	10.6 (N = 34)
All farm sizes	8.0 (N = 1,439)	14.2 (N = 151)	8.2 (N = 1,501)

Notes: Marginal farm size = <0.5 acres, small and medium farm size = 0.5–2.5 acres, and large farm size =>2.5 acres. Formal source refers to commercial banks and agricultural banks. Households were considered credit-constrained if they received less than what they requested.

Sources: World Bank, Bangladesh Institute of Development Studies (2013) and WB–InM (2010/2011).

However, if we interact the supply-constraint status with the amount of borrowing alone, the direction of the change is unclear. Thus, we estimate the outcome of equation (3) after suppressing gender-specific effects, as well as the effects of other variables, for both types of borrowers, expressed as follows:

$$\Delta Y_{it} = \beta \Delta \beta_{it} + \gamma \Delta K_{it} + \eta_{it} + \varepsilon_{it}, \quad (5)$$

where K indicates the borrowing-constraint status. For those households that are not credit-constrained (i.e., $K = 0$), we obtain the estimate of credit effect, β. For those that are credit-constrained, we obtain the marginal credit effect, $(\beta + \gamma)$. Depending on the sign of both coefficients (β and γ), the effect will be higher or lower for credit-constrained borrowers.

Table 5.11: Panel Estimates of the Impacts of Loan Volume and Credit Constraints on Household Income (P-score Weighted Household Fixed Effects) (N = 1,758)

Loan Variables	Income from Crop Production	Income from Livestock, Poultry, and Fishery	Total Farm Income	Total Nonfarm Enterprise Income
Log men's loans from microcredit (Tk)	−0.046 (−1.30)	−0.021 (−0.73)	−0.022 (−0.88)	0.136** (2.37)
Log women's loans from microcredit (Tk)	0.020* (1.94)	0.040** (2.15)	0.024 (1.58)	0.107** (3.85)
Log men's loans from formal sources (Tk)	−0.072 (−1.62)	0.036* (1.71)	−0.057 (−1.32)	0.123* (1.94)
Log women's loans from formal sources (Tk)	−0.033 (−0.58)	−0.047 (−0.41)	0.017 (0.22)	0.363 (1.42)
Log men's loans from microcredit (Tk) x household is credit-constrained	0.065* (1.72)	−0.016 (−0.50)	0.009 (0.40)	−0.004 (−0.08)
Log women's loans from microcredit (Tk) x household is credit-constrained	0.011 (0.55)	0.011 (0.51)	0.003 (0.19)	−0.004 (−0.13)
Log men's loans from formal sources (Tk) x household is credit-constrained	0.030 (0. 55)	−0.009** (−2.22)	−0.018 (−0.54)	−0.086 (−1.20)
Log women's loans from formal sources (Tk) x household is credit-constrained	0.117 (0.76)	0.035 (0.39)	−0.060 (−1.01)	0.010 (0.07)
R^2	0.312	0.137	0.088	0.054
Calculated effects of loans for credit-constrained households				
Log men's loans from microcredit (Tk)	0.018 (0.37)	−0.037 (−1.19)	−0.013 (−0.41)	0.132* (1.78)
Log women's loans from microcredit (Tk)	0.031 (1.37)	0.051* (1.98)	0.028* (1.71)	0.102** (2.83)
Log men's loans from formal sources (Tk)	−0.042 (−0.74)	−0.045 (−0.82)	−0.039 (−0.91)	0.036* (1.65)
Log women's loans from formal sources (Tk)	0.084 (0.58)	−0.012 (−0.13)	−0.043 (−0.63)	0.372 (1.48)

Notes: Outcomes are in log per capita Tk per month. Formal source refers to commercial banks and agricultural banks. Figures in parentheses are t-statistics based on standard errors clustered at the village level.

* and ** refer to a statistical significance of 10% and 5% or less. Regressions include more control variables at the household level (e.g., age, sex, and education of household head; log of land assets) and village level (e.g., price of consumer goods; male and female wages; infrastructure, including schools and electricity availability; and proportion of irrigated land).

Sources: World Bank, Bangladesh Institute of Development Studies (2013) and WB–InM (2010/2011).

Table 5.11 shows the calculated credit effect for constrained and unconstrained households by gender of borrowers. For unconstrained households (loan variables without interaction), women's credit from microcredit and men's credit from formal sources matter to income growth. For example, a 10% increase in women's borrowing from microcredit increases crop income by 0.2%, livestock income by 0.4%, and nonfarm income by 1.1%, without affecting total farm income. A 10% increase in men's loans from formal sources raises livestock income by 0.4% and nonfarm income by 1.2%. The interaction terms show the incremental effects of being credit-constrained. For example, household crop income goes up by 0.65% due to a 10% increase in men's loans from microcredit sources if the household is credit-constrained. The overall credit effects on income for credit-constrained households are given by the algebraic sum of the effects for unconstrained borrowers and the incremental effects of credit constraint. The credit effects for constrained households are thus calculated and shown in the lower part of Table 5.11. It seems that the credit effects are somewhat different between unconstrained and constrained borrowers. For example, women's loans from microcredit for constrained households do not matter to crop income, but women's microcredit loans for unconstrained households do matter. Specifically, women's microcredit loans for constrained households improve a household's overall farm income, which is not the case for unconstrained households. In contrast, men's borrowing from formal sources for constrained households increases nonfarm income only.

5.4.3 Returns to Borrowing from Institutional Sources

Table 5.11 reports credit effects in elasticity form since the outcome (income variables) and loan variables are expressed in natural logarithmic form. This gives us the credit effects in terms of the percentage change in outcomes due to percentage changes in the loan amount. An alternate way of expressing credit effects is in terms of marginal returns using monetary terms; for example, how much farm income goes up because of a Tk100 increase in loans. This can be done by transforming the findings reported in Table 5.11 in the following way. Let us assume the simplified outcome equation in log form: $logY = \beta logC$, where Y is the outcome such as per capita farm income (in taka) and C is the loan variable (in taka). Then the marginal return can be obtained by differentiating the outcome with respect to the credit variable in the following way:

$\frac{\delta Y}{\delta X} = \beta . \frac{\overline{Y}}{\overline{X}}$, where $\overline{Y}$ and $\overline{X}$ are the sample means of the outcome and loan variable, respectively.

The right-hand side of this equation gives the change in outcome for unit change in loan value. Since the outcome is in per capita terms, we can multiply it by the household size to get the aggregate outcome at the household level; further multiplying by 100, we get changes in outcomes for a Tk100 change in loans. Table 5.12 reports the findings for the change in household income for a Tk100 change in loans.

Table 5.12: Marginal Return to Household Borrowing on Household Income based on Table 5.11 (taka per Tk100 borrowed)

Borrowing Variables	Income from Crop Production	Income from Livestock, Poultry, and Fishery	Total Farm Income	Total Nonfarm Enterprise Income
Credit-unconstrained households				
Men's loan from microcredit	–7.1	–2.3	–7.5	15.3**
Women's loan from microcredit	0.8*	1.1**	2.1	26.7**
Men's loan from formal sources	–8.2	1.8*	–14.8	18.3*
Women's loan from formal sources	–11.0	–10.9	12.6	16.2
Credit-constrained households				
Men's loan from microcredit	0.6	–0.6	–0.8	2.6**
Women's loan from microcredit	0.6	0.5*	1.5*	9.8**
Men's loan from formal sources	–1.3	–0.8	–2.0	1.5*
Women's loan from formal sources	6.6	–5.2	–5.6	3.8

Notes: Returns are not in per capita but for household as a whole. Formal source refers to commercial banks and agricultural banks.* and ** refer to a statistical significance of 10% and 5% or less.

Sources: World Bank, Bangladesh Institute of Development Studies (2013) and WB–InM (2010/2011).

As expected, the highest return from credit was observed for nonfarm income, regardless of the source of credit. An additional microfinance loan of Tk100 for women increases total household nonfarm income by Tk27 for unconstrained households and by Tk10 for constrained households.[24]

[24] This perhaps suggests that the lenders are good at figuring out who should not get the loans they request.

Similarly, an additional formal loan of Tk100 for men raises total nonfarm income by Tk18 for unconstrained households and by about Tk2 for constrained households. While other income variables show statistically significant increases, these increases are considerably low in magnitude.

In addition to marginal returns, credit effects can also be measured in terms of average returns to borrowing for all borrowers regardless of credit volume; this is called "average treatment of the treated." To do so, we express the credit variables in terms of dummy variables as opposed to loan volumes; that is, borrowing households get a value of 1, while non-borrowing households get a value of 0 for the dummy variable. Average returns on credit are reported in Table 5.13, which takes into account credit constraints. The results are similar to those for marginal effects. Again, returns are highest for nonfarm activities. Women's borrowing from microfinance increases nonfarm income by almost 58% for unconstrained households and by 37% for constrained households. Men's borrowing from formal sources causes nonfarm income to rise by 100% for unconstrained households. Similar to our earlier findings, the returns are higher for unconstrained households than they are for constrained households. In addition, and as expected, average returns are higher than the marginal returns reported in Table 5.13.

Table 5.13: Panel Estimates of the Impacts of Borrowing Status and Credit Constraints on Household Income (P-score Weighted Household Fixed Effects) (N = 1,758)

Borrowing Variables	Income from Crop Production	Income from Livestock, Poultry, and Fishery	Total Farm Income	Total Nonfarm Enterprise Income
Men borrowed from microcredit	−0.340 (−1.01)	−0.233 (−0.90)	−0.199 (−0.87)	0.270** (2.46)
Women borrowed from microcredit	0.075* (1.89)	0.287* (1.65)	0.160 (1.53)	0.577** (2.23)
Men borrowed from formal sources	−0.504 (−1.32)	0.300* (1.93)	−0.415 (−1.04)	1.00* (1.97)
Women borrowed from formal sources	−0.410 (−0.82)	−0.431 (−0.44)	0.060 (0.09)	1.373 (1.48)
Men borrowed from microcredit x household is credit-constrained	0.651* (1.91)	−0.189 (−0.62)	0.089 (0.42)	−0.127 (−0.04)

continued on next page

Table 5.13: ***Continued***

Borrowing Variables	Income from Crop Production	Income from Livestock, Poultry, and Fishery	Total Farm Income	Total Nonfarm Enterprise Income
Women borrowed from microcredit x household is credit-constrained	0.059 (0.29)	0.091 (0.42)	0.009 (1.35)	−0.014 (−0.04)
Men borrowed from formal sources x household is credit-constrained	0.284 (0. 58)	−0.063** (−2.17)	0.135 (0.45)	−0.254 (−0.09)
Women borrowed from formal sources x household is credit-constrained	1.580 (0.92)	0.432 (0.63)	−0.383 (−0.76)	−0.012 (−0.01)
R^2	0.311	0.136	0.087	0.050
Calculated effects of borrowing for credit-constrained households				
Men borrowed from microcredit	0.312 (0.67)	−0.422 (−1.44)	−0.110 (−0.37)	0.143** (1.63)
Women borrowed from microcredit	0.134 (0.61)	0.379* (1.72)	0.169* (1.89)	0.371* (1.73)
Men borrowed from formal sources	−0.220 (−0.47)	−0.364 (−0.71)	−0.280 (−0.71)	0.445* (1.73)
Women borrowed from formal sources	0.748 (0.64)	0.001 (0.01)	−0.323 (−0.53)	0.362 (1.37)

Notes: Outcomes are in log per capita Tk per month. Formal source refers to commercial banks and agricultural banks. Figures in parentheses are t-statistics based on standard errors clustered at the village level.

* and ** refer to a statistical significance of 10% and 5% or less. Regressions include more control variables at the household level (e.g., age, sex, and education of household head; log of land assets) and village level (e.g., price of consumer goods; male and female wages; infrastructure, including schools and electricity availability; and proportion of irrigated land).

Sources: World Bank, Bangladesh Institute of Development Studies (2013) and WB–InM (2010/2011).

5.4.4 Is Borrowing from Institutional Sources Cost-Effective for Farmers?

One of the purposes of this chapter is to assess the cost-effectiveness of the Government of Bangladesh's policy of financing agriculture through a comparison of the benefits to borrowers and the cost of borrowing from institutional sources. Benefits can be measured by the average returns to borrowing.

At a minimum, the estimates of average yearly returns from income-generating activities such as farm and nonfarm activities (even in the most limited sense because borrowing generates other induced benefits) can be compared with the average cost of borrowing per year.

If households borrow mainly for nonfarm activities and women are the principal borrowers, we find that the average return to borrowing from a microfinance program is about 37% for a credit-constrained household; this is compared to the average lending rate of 20% for a loan from microfinance organizations. Thus, borrowing by women from a microfinance organization appears to be cost-effective for supporting rural nonfarm activities, as the return is higher than the cost. On the other hand, if women use a loan from a microfinance program to support farm activities, the average return for a credit-constrained household is 17%, which is lower than the average lending rate of MFIs but higher than the average lending rate of agricultural development banks (8%).[25]

If men borrow from a microcredit source to support rural nonfarm activities, the average return is about 14%, which is much lower than the average MFI lending rate of 20%. However, if men borrow from formal sources to support rural nonfarm activities, the average return is 44%, which is again much higher than the average lending rate of 8% for agricultural development banks.

These findings could impact farmers' borrowing decisions. First, the average return to loans can generally cover the cost of borrowing when that borrowed amount goes toward rural nonfarm activities; this holds true for formal and microfinance sources of borrowing, depending on whether a man or a woman is borrowing. However, when a loan goes mainly to support farm activities, borrowing from microfinance sources is not necessarily cost-effective for farmers, but borrowing from formal sources is likely to be. This is in part because interest rates are higher with microfinance loans (20%) than with loans from agricultural development banks (8%).

[25] The results only correspond to the coefficients that are significant at the 10% level or higher.

5.5 Conclusion

The Government of Bangladesh has paid increased attention to raising agricultural productivity, especially food production, in recent years. This interest has been driven by concerns about rising food insecurity, population growth, and climate change. It is established that better institutional access to credit and other financial services from both formal sources (e.g., agricultural and commercial banks) and semiformal sources (e.g., microfinance) can help rural households smooth risks and access inputs and other technologies with which to modernize agriculture and improve farm/nonfarm linkages.

This chapter evaluates the Government of Bangladesh's agricultural credit policy, which extends credit and financial services by commercial and agricultural development banks to rural populations. The purpose of this policy is to provide affordable credit to farmers in order to enhance agricultural productivity by stimulating the adoption of modern agricultural technologies and agricultural diversification. With the help of donors, the Government of Bangladesh has also supported the growth of microfinance institutions (MFIs) to extend credit to landless and marginal farmers in order to enhance self-employment and income in the rural nonfarm sector. In contrast to government-aided agricultural development banks, however, throughout their development of four decades, MFIs in Bangladesh have come to rely increasingly on resources mobilized by the MFIs themselves and less on donor or concessionary funds (although some do still benefit from donor funds such as the MFI operated by PKSF).

While the portfolio structure of agricultural development banks has largely supported agriculture in an unsustainable way, the portfolio structures of MFIs, which largely extend services to augment rural nonfarm production, have changed in recent years to include agriculture lending. The MFIs are regulated by a body which, among other oversight policies, has set a ceiling on their interest rates at 27%. Most clients of MFIs live in rural areas that are not well served by commercial banks and tend to be women, who rarely receive loans from commercial banks or agricultural development banks. Hence, commercial banks and MFIs generally do not directly compete.

Nonetheless, there remains fierce competition among MFIs themselves over product and client diversification. MFIs and agricultural development banks both face disasters triggered by natural hazards and agroclimatic factors that affect

borrowers' risk and overall loan recovery. While MFIs have unique ways of coping with these adverse situations, agricultural banks have depended on government support to survive such calamities that affect their loan portfolios.

An analysis of the cost-efficiency of both agricultural development banks and MFIs active in rural areas shows that while MFIs are cost-effective, agricultural development banks are not. Specifically, agricultural development banks generally cannot cover their costs, in part because the interest rates they charge are seriously constrained by deliberate government policy. While the Government of Bangladesh allows MFIs to charge high interest rates (maximum 27%) for microlending, agricultural development banks cannot charge more than 9% for agricultural lending. To make formal lending for agriculture more cost-effective for banks, and thus to encourage banks to lend to farmers, banks and MFIs must be allowed to operate on a level playing field.

An analysis of household survey data shows that financial inclusion, measured in terms of having an account with a financial institution such as a bank, MFI, or mobile financial service, is about 31% in Bangladesh. Although 56% of farmers take out loans, only 8% borrow from financial institutions. In addition, of the 56% of borrowers in Bangladesh, only 4% use their loans for productive purposes such as agriculture and businesses.

Using detailed household panel data spanning the 1998–2011 period, we find that MFI participation in Bangladesh has a significant positive effect for women borrowers in terms of increasing crop, non-crop (i.e., livestock, poultry, and fisheries), and total farm and nonfarm income. Similarly, when men borrow from formal sources, these loans increase livestock income and nonfarm income. The presence of credit constraints appears to matter more for crop and other types of farm income; these incomes do not increase as much as a result of loans from financial institutions if the borrowers are credit-constrained, meaning that supply-side constraints have negative effects for borrowers.

We find that borrowing from microfinance institutions is generally cost-effective for nonfarm activities, despite the fact that the average lending rate of MFIs is much higher than that of banks extending services to rural areas. The average returns to farming are generally lower, suggesting that loans from commercial banks would be more cost-effective than loans from MFIs.

However, we find MFIs to be cost-effective in terms of both financial efficiency and operational efficiency; agricultural development banks are not cost-effective, as mentioned previously, partly because of the government's interest rate policy and the lack of incentives for state-owned financial institutions.

Microfinance institutions are reasonably sustainable, partly because they are allowed to charge interest up to 27%, which is much higher than the deposit rate and the rate they pay for the funds borrowed from PKSF. PKSF is, in turn, funded by the Government of Bangladesh and donors such as the World Bank. MFIs could extend their services to cover more farmers if they were allowed to mobilize savings through specialized banks like Grameen Bank.

On the other hand, formal banking for agriculture appears to be very weak and unsustainable. To help address this weakness, the Government of Bangladesh must ensure that public funds are properly and efficiently utilized in order to promote efficiency in the agricultural finance system. As of now, state-owned agricultural development banks do not mobilize funds from the public because they cannot lend profitably. Thus, government policy must be consistent with the reality on the ground: agricultural development banks are forced to charge an interest rate which is one-third the rate charged by MFIs. In addition, while agricultural development banks are often mandated to forgive loans given to farmers in the case of crop failures and other disasters, MFIs are not forced to adopt such loan forgiveness practices. These misdirected policies, which contribute to the worsening of a potentially important source of agricultural finance, must be discouraged. The Government of Bangladesh could intervene more effectively by developing marketing facilities, constructing rural roads, and supporting a crop insurance system to help farmers and lenders alike to mitigate agricultural risks, particularly those stemming from climate change. At the same time, institutional design, including financial regulations, must promote a level playing field for all actors in order to support a competitive environment in which the rural financial system can thrive.

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CHAPTER 6

India: Trends in Institutional Credit to Agriculture

Gayatri B. Koolwal

6.1 India's Agricultural Sector Expands, but Challenges Remain Over Productivity Growth

This chapter uses various supply- and demand-side analyses to examine the roles that institutional credit plays in improving agricultural productivity in India. In recent years, the Government of India has pursued different strategies to raise farmers' incomes—ranging from irrigation, provision of high-quality seeds, and strengthening of agricultural value chains to development of farm–nonfarm linkages, promotion of linked activities across horticulture and livestock producers, and provision of lower-cost crop insurance. Institutional credit to agriculture has also played a large part in the government's strategy to raise investment, productivity, and incomes in the agricultural sector. Credit to the sector has grown rapidly over the last two decades and has dominated policy initiatives to expand financial services in agriculture.

Agricultural loans do not have as high a share in overall nonperforming assets as other priority sectors (such as micro- and small enterprises). However, since the advent of regional debt waiver policies following the national agricultural debt waiver and relief scheme introduced in 2008, large shares of farmers have defaulted on their agricultural loans, including through the Kisan credit card (KCC) scheme introduced by the government. This chapter discusses the landscape of different institutions engaged in agricultural lending in India, as well as the related challenges and opportunities present in lending to the country's growing base of small and marginal farmers.

Given the concerns over whether agricultural finance leads to significant investments in agriculture, in addition to a supply-side analysis, we use the 2004–2005 and 2011–2012 panel rounds of the nationally representative

India Human Development Survey (IHDS) to shed light on how borrowing has been associated with increased expenditure on seeds and fertilizer and with subsequent farm production and income. Previous studies on the role of credit in improving agricultural output and income in India have focused on district- or state-level analyses (Binswanger and Khandker 1995; Das, Senapati, and John 2009; Narayanan 2016). In this chapter, we conduct a household-level analysis of the IHDS to show that larger cultivators are more likely to borrow for agriculture and that borrowing for agriculture is associated with higher agricultural investments, as well as with increased area under irrigation and greater crop income. Borrowing for other purposes, including consumption, does not have any significant indirect effect on farm income.

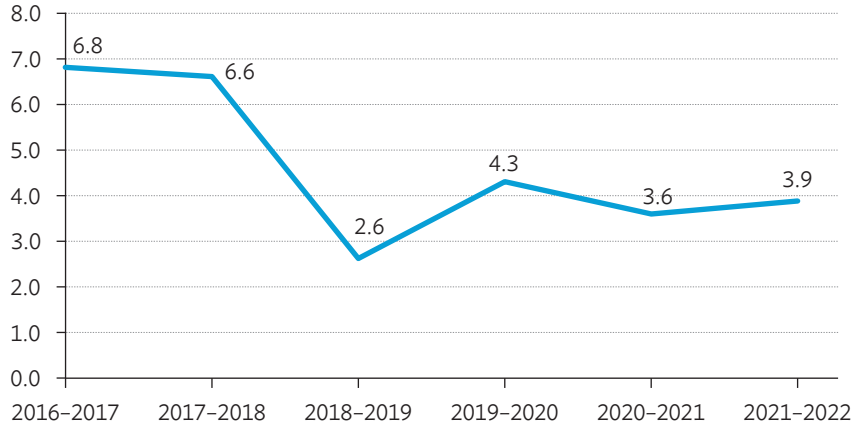
The analysis also confirms that broad distributional inequalities persist in terms of who receives credit. Small farmers, who often do not have a bank account or do not frequently use one, are much less likely to have access to credit than larger farmers. Given that the vast majority of farmers in India now own less than 2 hectares of land, this inequality has even greater implications for overall investment in such areas as infrastructure and markets, use of fertilizers and pesticides, and proper targeting of agricultural extension services. While smaller farmers who borrow do invest more in seeds and fertilizer, the broader effects of credit on agricultural investment and production tend to be concentrated among larger landowners. Better targeting of smaller farmers, including a clearer understanding of these farmers' production and borrowing constraints, will be important in raising agricultural productivity going forward. Given the onset of the coronavirus disease (COVID-19) pandemic, the findings have important implications for the design of recovery programs going forward, as well as in the analysis and design of future survey panel rounds.

India's agricultural sector remains a global powerhouse and is critical to employment (employing about half of the national workforce) and sustainable economic growth (contributing to about 17.5% of gross domestic product [GDP]). While structural changes in India's economy, including rapid industrialization and growth of the service sector, have reduced agriculture's share in GDP over the last several decades (according to estimates from the World Bank, from about 27% in 1990 to 18% in 2004 and 15% in 2017), the agricultural sector continues to play a crucial role in economic growth and poverty reduction.

However, productivity and growth in India's agricultural sector has generally been more volatile than growth in other sectors, such as industry and services, and increased land fragmentation, resource and input scarcity, and growing climate variability all point to even greater uncertainties for farmers in the years ahead. Uncertainties over weather patterns and the growing share of smaller, poorer farmers have also made designing investments in agriculture—including modernizing agricultural value chains and developing innovative technologies and inputs to improve productivity—more complex.

Addressing food security among poor people also remains a central policy concern for India's government, particularly in the face of a growing middle class in urban areas and rising incomes, but contrasted with stagnating growth in rural employment. Food availability has increased in India, but growing concerns remain over climate change, an increasing share of small and marginal farmers due to fragmentation of landholdings, and growing scarcity in water and other natural resources that also affect crop diversification. The COVID-19 pandemic and strict lockdowns imposed by the government in early 2020 led to severe supply shocks and reduced growth, although the decline in the agricultural sector was not very large (Figure 6.1).

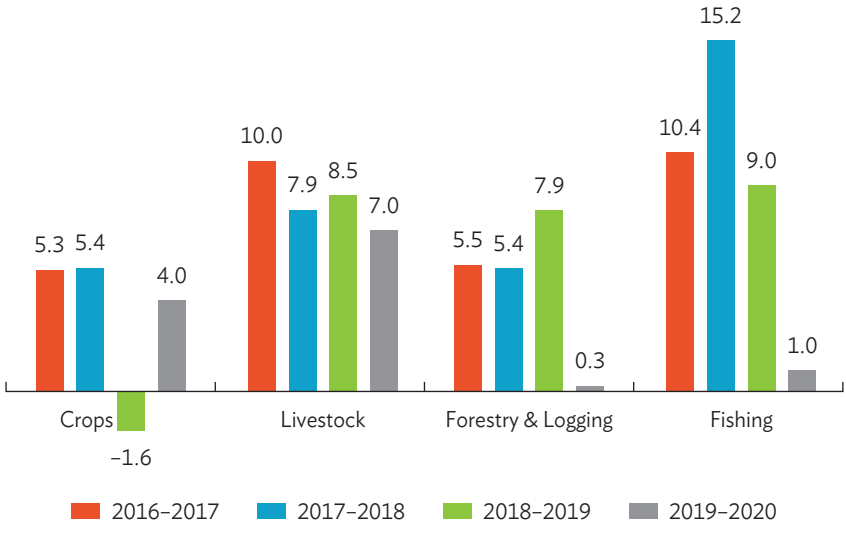
Figure 6.1: Percentage Growth in the Agriculture and Allied Sectors, 2016–2022



Source: National Statistical Office, Ministry of Statistics and Programme Implementation, India: First Advance Estimates of National Income, 2021–2022.

Figure 6.2, which presents data leading up to 2020, shows that some support to the sector was likely due to relatively strong growth in gross value added in livestock activity. Other areas of agriculture, including crop agriculture, have not fared as well. The trends for crop agriculture are worrisome, since this area accounts for more than 60% of the country's agricultural sector and plays a major role in the country's food security,[1] and significant challenges remain to productivity growth and food security. These challenges stem from natural resource depletion, climate variability, and the fragmentation of land holdings, all of which have placed growing stresses on crop production.

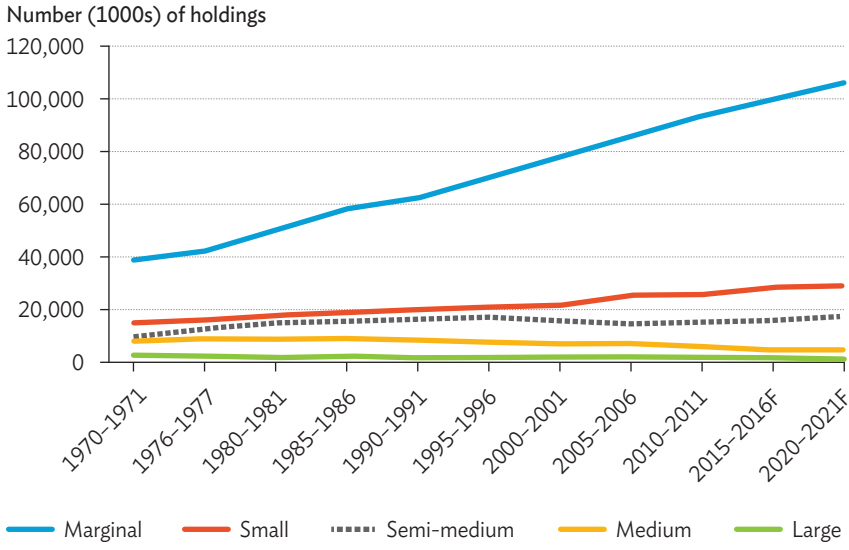
Figure 6.2: Percentage Growth of Gross Value Added in Agriculture (at 2011–2012 prices)



Source: Based on data received from Department of Agriculture and Farmers Welfare (DAFW). Third revised estimate for 2017–2018, second revised estimate for 2018–2019, and first revised estimate released in January 2021.

[1] Also see World Bank (2012).

Figure 6.3: Growing Fragmentation of Operational Holdings Across Different Farming Sizes



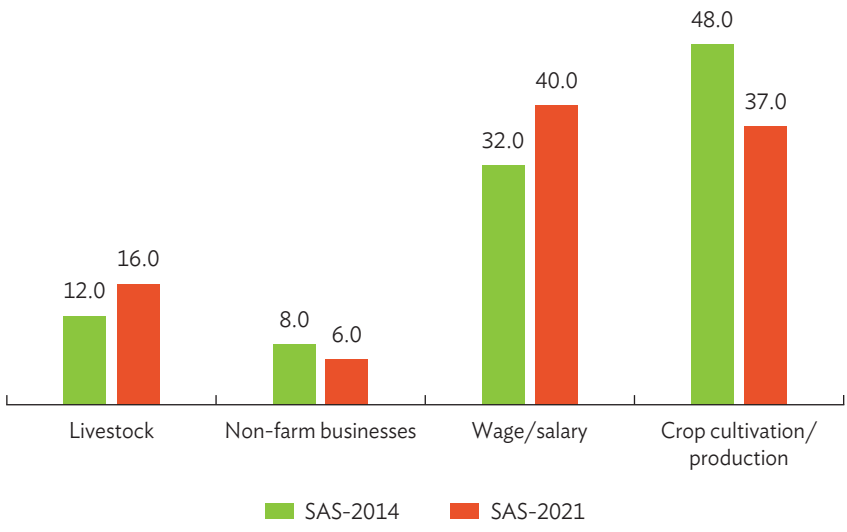
Source: National Statistics Office, Ministry of Statistics and Programme Implementation.

Figure 6.3 shows how agricultural land holdings in India have become increasingly fragmented over time, with the share of marginal farmers increasing the fastest over the last several decades compared to other landholding groups (currently, about 85% of farmers are marginal).[2] This is further underscored by Figure 6.4, which shows that in recent years, the share of agricultural households' income stemming from crop cultivation and production has declined as compared to work in wage and livestock activity.

Access to credit is a key constraint to improved inputs and agricultural technology, particularly among smaller farmers. Quality seeds, for example, are essential to the effectiveness of other agricultural inputs (including fertilizers, pesticides, and irrigation), and particularly amid more frequent climate-related shocks that necessitate new, sustainable approaches to farming.

[2] Varshney et al. (2021).

Figure 6.4: Percentage Composition of Average Monthly Income of Agricultural Households



Source: National Statistical Office, Ministry of Statistics and Programme Implementation, India: Land and Livestock Holdings of Households and Situation Assessment of Agricultural Households (2014, 2021).

Major periods of productivity growth in Indian agriculture—including the Green Revolution of the 1960s–1970s, as well as recent growth in the production and productivity of maize, cotton, and fruits and vegetables—have all been driven by improvements in seed or planting materials (Ministry of Agriculture and Farmers Welfare 2016). However, access to quality seeds has been difficult for most small farmers, limiting their ability to grow higher-value crops and reach higher-paying markets. The organized seed sector (which includes both private sector and public sector companies and which distributes certified and better quality/improved seeds) accounts for about 30%–35% of the total seeds distributed in the country but typically charges prices that are too high for smaller farmers to afford.[3]

[3] The remaining share of seeds come from an unorganized sector of farm-saved seeds (Ministry of Agriculture and Farmers Welfare 2016) and can also include cloned/counterfeit seeds.

The expansion of institutional credit is important for improving agricultural productivity, but bank credit constitutes less than one-quarter of total agricultural credit (Ministry of Agriculture and Farmers Welfare 2016).[4] Small farmers, who often do not even have a bank account, are much less likely to have access to formal credit than larger farmers. This has even greater implications for investment in such areas as infrastructure and markets, production of fertilizers and pesticides, and agricultural extension services, given the growing share of marginal and small farmers in India's agricultural sector.

In this chapter, context is first provided on sources of financial services among agricultural households, including institutional sources of credit; mobile banking, savings accounts, and insurance; as well as noninstitutional sources. The discussion is followed with an empirical analysis of the distributional effects of institutional borrowing, and in particular on agricultural investments, across the landholding distribution. The discussion and analysis draw on several sources of data over the last few decades, including administrative data, the World Bank's Global Financial Inclusion database (known as the Findex), All-India Debt and Investment Survey, and India Human Development Survey. Using the macro- and micro-level data, recommendations are outlined on how agricultural households can be better targeted by financial services, with the aim of raising productivity and incomes across the distribution.

6.2 Financial Services in Agriculture and the Rapid Growth of Institutional Credit

Institutional credit to agriculture has grown rapidly since the mid-2000s due to many policy shifts aimed at sustainably raising productivity growth and rural incomes (Box 6.1), although growth slowed in recent years leading up to the COVID-19 pandemic. Historically, banks in India have been required to lend 40% of their total credit to "priority sectors," which include agriculture and small-scale industry. Figure 6.5 reflects the percentage shares of India's main institutional lenders to agriculture (cooperative banks, scheduled commercial banks [SCBs], and regional rural banks [RRBs], all of which are detailed in Box 6.2); over time, SCBs have overtaken cooperative banks as the main institutional lending source within agriculture.

[4] This is also in spite of two-thirds of capital formation in agriculture through borrowing from banks.

Box 6.1: Major Policies Since the Late 1990s to Expand Agricultural Institutional Credit

1998–1999	**Kisan credit card (KCC) scheme:** Also known as cash credit or a revolving fund, this program was introduced to supply credit to small farmers. The Kisan credit card provides a lump-sum loan to farmers, which they can draw on throughout the year for crop investments, including the purchase of seeds, fertilizers, pesticides, farm help, and irrigation. Farmers are expected to pay back the entire amount within 1 year, typically after crop output is sold, after which they can apply for a new round of Kisan credit. In 2018, the Indian government issued revised guidelines to benefit smaller farmers by waiving standard security requirements, such as pledging crops to secure a loan, for loans of up to ₹100,000.
2004–2005	The government introduced a **comprehensive credit policy**, pledging to double the amount of agricultural credit across institutional sources over a 3-year period, including expanding targeting of smaller farmers and expanding the number of self-help groups (SHGs) by about 22% to cover 2.9 million people by 2007.
2006–2007	**Interest subvention scheme to reward prompt repayment of loans:** Under this scheme, farmers get short-term crop loans up to ₹300,000 at a 7% interest rate. If the loan to the bank is paid on time, there is an additional interest subvention of 3%, making the effective rate of interest 4% per year. During 2017–2018, the central government provided interest subvention of 5% per year to all prompt payees for short-term crop loans of up to 1 year.
2008	**Agricultural debt waiver and debt relief scheme:** Instituted following the 2008–2009 global financial crisis, this scheme amounted to nearly 1% of gross domestic product in 2008. The scheme involved waiving debt for small and marginal farmers owners of up to 2 hectares of land, as well as an opportunity for a one-time settlement for other farmers (a rebate of 25% against the payment of the balance 75%).
2010–2011	**Recapitalization of regional rural banks:** This program, which has been continually extended since 2010, involves an infusion of government funds to improve RRBs' capital-to-risk weighted assets ratio (CRAR).
2014–present	Many states have announced additional loan waiver programs similar to the 2008 policy.
2020–present	The Government of India has been introducing additional stimulus programs to digitize KCC as well as reduce effective interest rates that farmers face on bank loans.

Box 6.2: Main Sources of Institutional Lending for Agriculture

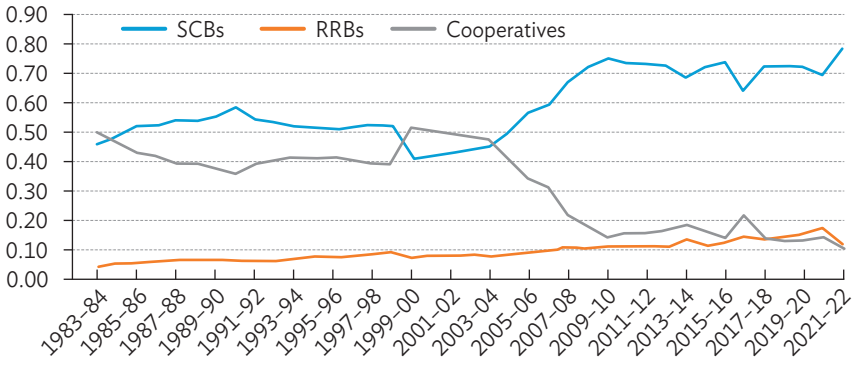
Banks

- **Cooperative banks:** Cooperatives are registered under the 1912 Cooperative Societies Act and are set up mainly to serve small industry/agriculture and self-employed workers. Rural cooperative banks are divided into those providing short-term services (state cooperative banks, district central cooperative banks, and primary agricultural credit societies, the latter which operate at the village or subdistrict level) and those providing long-term services (state cooperative agriculture and rural development banks, and primary cooperative agriculture and rural development banks, which operate at the district/block level). In recent years, monitoring cooperative banks has become difficult given the complicated tiered structure.
- **Scheduled commercial banks (SCBs):** Among SCBs are the State Bank of India and its associated banks, nationalized banks, private sector banks, regional rural banks (RRBs), and foreign banks. As of March 2017, about 30% of SCB branches were located in rural areas, mostly in the form of public sector and nationalized banks and RRBs.
- **Regional rural banks (RRBs):** RRBs, which were established in 1975, are SCBs designed to target agriculture and other rural sectors—and specifically smaller farmers and entrepreneurs—as an alternative to the cooperative credit structure. They operate at the regional level in different states in India.

Other Major Institutional Sources

- **Self-help groups (SHGs):** Within finance, banks provide credit to SHGs against a group guarantee, and members of the group stand as collective guarantors. Banks allow the members of the SHGs to decide which members of the group will borrow and how much, as well as how the loan will be repaid. These loans started out as term loans, which members are expected to repay in regular installments over a period of time. In 2011, the government issued a directive for commercial banks to convert all SHG term loans to cash credit, to save on the high transaction and monitoring costs for banks.

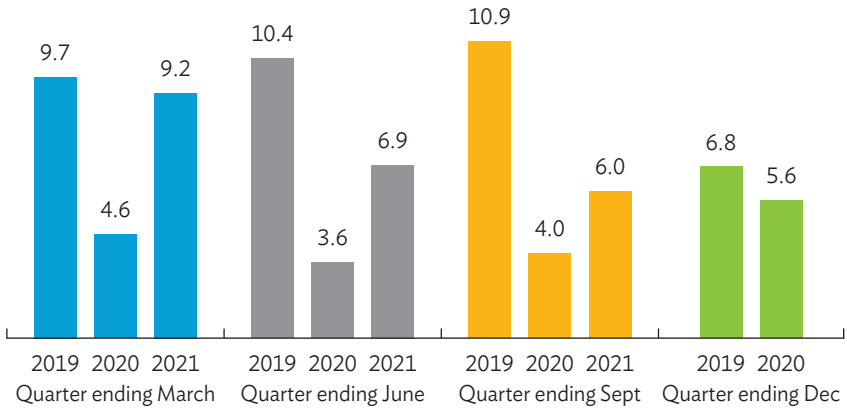
Figure 6.5: Share of Institutional Lending (Loans Outstanding) to Agriculture, 1983–2022



RRB = regional rural bank, SCB = scheduled commercial bank.

As Box 6.1 shows, there have been several efforts over the last 20 years to expand agricultural credit in India, although the pace of expansion has slowed in recent years. A comprehensive credit policy was initiated in 2004–2005 to double the volume of credit to agriculture over a period of 3 years (this volume ultimately doubled in 2 years); in addition, an interest rate subvention scheme was introduced in 2006–2007, and a recapitalization scheme for regional rural banks began in 2010–2011. Year-on-year real outstanding agricultural credit revealed negative growth rates, however, between 2015–2016 and 2019–2020 (Chavan and Ramakumar 2022; Ramakumar 2022). Just before and after the onset of the pandemic in 2020, year-on-year growth rates declined substantially, with some recovery in 2021 but still far less growth than in 2019 (Figure 6.6).

Figure 6.6: Year-on-Year Growth Rates (Percentage by Quarter) in Outstanding Real Agricultural Credit from Rural Scheduled Commercial Banks, 2019, 2020, and 2021



Source: Reserve Bank of India; taken from Ramakumar (2022).

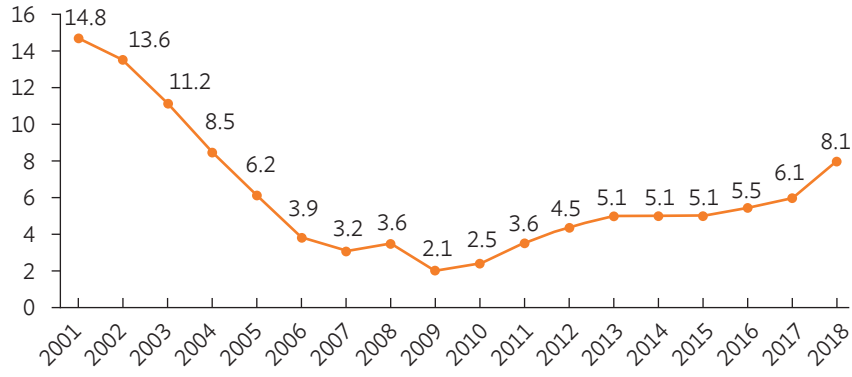
Another issue is the relative emphasis on short- versus long-term financing. **Short-term financing** is typically used for seasonal agricultural operations and mixed farming activities, while **longer-term loans** are used for purchasing agricultural inputs and machines. Since 2006–2007, when the interest subvention scheme was introduced for short-term crop loans (Box 6.1), the distribution of credit has been skewed toward production credit as opposed to crop-related

investment credit, with about 75% of credit outstanding going to short-term crop loans in 2018, and 25% for investment credit. Land fragmentation, as discussed earlier, has also contributed to the decline in long-term lending for capital investments. This trend poses concerns for longer-term investment and growth in the sector, and it should be a policy priority going forward.

6.2.1 Financial Performance of Banks in Agriculture

As discussed previously, agriculture constitutes a riskier area of investment for banks due to a variety of factors, including climate-related fluctuations that contribute to water shortages, inadequate storage facilities and transport/marketing channels, poor management of land records and difficulties in establishing land rights (as land is a major source of collateral), and a rapidly growing base of small and marginal farmers. Between 2009 and 2013, agriculture's share of nonperforming assets (NPAs), relative to other "priority sectors" such as micro and small enterprises, as well as export credit, education, housing, social infrastructure, and renewable energy, increased considerably from 25% to about 42% (Reserve Bank of India various years; see also Reserve Bank of India [2021]). For all areas, including other non-priority sectors, this increase was from 12% to 17%, as the non-priority sectors have a much higher share of NPAs overall. Within agriculture as well, Figure 6.7 shows that the share of NPAs has been increasing since 2009, after declining steadily between 2001–2009.

Figure 6.7: Share of Nonperforming Assets in Agriculture, Scheduled Commercial Banks, 2001–2018



Source: Reserve Bank of India (various years).

The spread of regional debt waiver policies following the national agricultural debt waiver and relief scheme introduced in 2008 also led to an increase in farmers defaulting on their loans. A recent study using district-level panel data between 2001 and 2012 found that the debt waiver and relief program actually induced many banks to shift away from districts with greater risk by allowing these banks to clean their books of consistently underperforming or nonperforming loans and move on to better-off districts (Giné and Kanz 2018). As states began introducing their own debt waiver schemes (which have also been politically attractive during elections), recent concerns have arisen over increasing public debts and the long-term effects of these waiver programs on public spending.

In general, the share of agricultural loans as a share of nonperforming assets remains high but not necessarily higher than other sectors, particularly non-priority sectors where the share of NPAs increased from 48% in 2011 to 59% in 2013 and then to 70% in 2017.[5] The broader question then becomes, given recent policy initiatives that have tended to isolate the worst-off areas, how can agricultural credit effectively be targeted to raise productivity and incomes in the sector? Complementing waivers with other public investments, as well as with incentives for private investment, may be a more appropriate longer-term solution than loan waivers alone.

6.2.2 Other Rural Financial Services: Accounts, Mobile Banking, and Insurance

Other financial services have also expanded across rural India, although not to the extent of agricultural credit. Deposit and current accounts have grown recently among farmers, particularly following a push in 2009 to further expand rural bank branches and "branchless banking" (in which a large network of business correspondents are assigned to different villages and use mobile devices to help families conduct financial transactions). Along with reducing the costs of establishing physical bank branches, branchless banking has been shown to help improve savings among the rural poor (see Kochar [2018] for a study from the state of Karnataka). The expansion of branchless banking has other

[5] A main reason for this is that banks often engage in the practice of "evergreening": delaying the recognition and therefore resolution of NPAs. In 2015, the Reserve Bank of India removed incentives to allow evergreening, so that the share of NPAs increased substantially afterwards. See, e.g., Roy, Subramanian, and Ravi (2018).

additional benefits, since rural bank branch growth has remained flat or even negative for long periods over the last several years.[6] In general, the pandemic accelerated the use of digital financial services in agriculture, including an initiative within the Reserve Bank of India announced in 2022 that will push electronic delivery of Kisan credit card (KCC) loans in a paperless and hassle-free manner and also reduce the turnaround time and avoid multiple visits to bank branches.

As with credit, inefficiencies have also persisted in the targeting and use of additional bank services. Mobile services tend to be focused in more populated locales, for example, and the usage of different types of accounts across the board tends to be limited. The 2011–2012 round of the nationally representative India Human Development Survey shows that about 57% of agricultural households have a deposit or savings account with a bank; similarly, the 2014 Findex sets this figure at 63%. However, account ownership can vary substantially by farmers' landholdings/wealth, and many accounts are seldom used. The 2014 Findex survey, which provides a breakdown of borrowing by occupational status, for example, shows that among the 63% of farmers with a financial institution account, only half reported making a deposit into the account in the last 12 months, and just 28% reported using these accounts for savings.[7] Particularly among smaller farmers with little or no savings, accounts are typically used for government transfers. The 2014 Findex also underscores the importance of cash in farmers' transactions, even as technology and financial services are becoming increasingly linked—among those receiving agricultural payments, 83% reported receiving them in cash, 11% into an account, and just 3% through a mobile phone. As the use of mobile technology, and accompanying data collection, expands to other services, clearer insights will emerge regarding how these applications have translated into productivity and related outcomes for farmers.

[6] Branch expansion is not necessarily tied to agricultural growth, however. Using data for 16 states between 1961 and 2000, Burgess and Pande (2005) found that rural branch expansion did improve economic growth and reduced poverty in rural areas, but these impacts were due mainly to growth in nonagricultural output and small-scale manufacturing and services.

[7] The percentage of farmers having an account with a financial system was 88% in both 2017 and 2021. However, the mobile financial services (MFS) rate among farmers was much lower than the financial account rate—it was only 2.5% in 2017 and 20.4% in 2021. In contrast, in neighboring Bangladesh, the MFS rate was 23.8% in 2017 and 45.7% in 2021, while the financial account rate was half of India's rate.

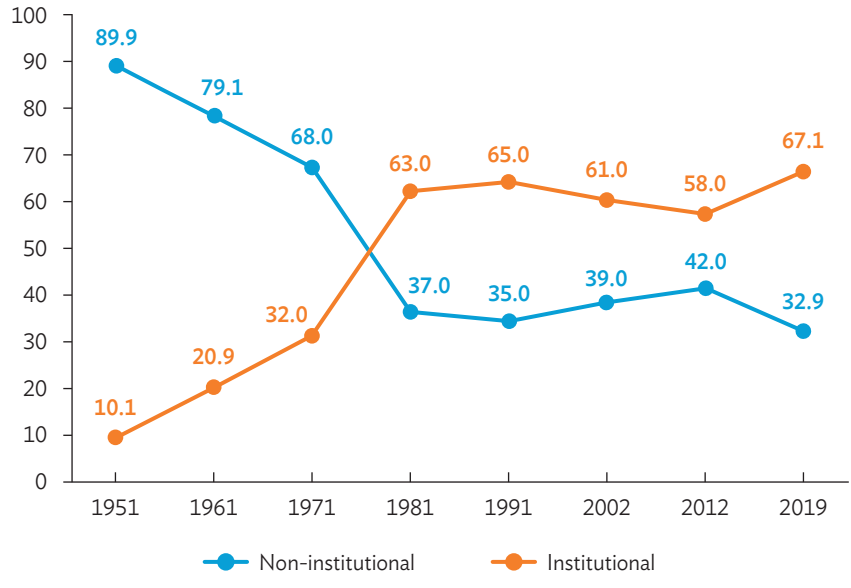
India's government has also focused on expanding crop insurance as a way to protect farmers from rainfall and climate variability, as well as other potential risks. India has had several crop insurance schemes over the last several decades, including the Comprehensive Crop Insurance Scheme (CCIS) in 1985, the National Agricultural Insurance Scheme (NAIS) in 1999, and the Modified National Agricultural Insurance Scheme (MNAIS) in 2013. The MNAIS in particular set premiums in the range of 2%–15% of the total value insured, with the government contributing up to 75% of total premiums. As of 2016–2017, however, only about 30% of gross cropped area across the country was insured (Ministry of Agriculture and Farmers Welfare 2016; Gulati, Terway, and al Hussain 2018). Factors contributing to this low take-up rate include high premiums, lack of land records, poor coverage for localized crop damage, and lack of awareness among farmers.[8] Most recently, the government introduced the Pradhan Mantri Fasal Bima Yojana (PMFBY) in 2016; this scheme eliminates all caps on the government's contributions to insurance premiums in an effort to expand coverage. (The government's ambitious target at the outset was 50% of cropped area to be covered in 3 years, although this target is likely to be reached more slowly.) To help expand farmers' knowledge about crop insurance programs, as well as about market prices for agricultural outputs, the government has been involved in developing a series of mobile phone applications (World Bank 2017). The government has also introduced digitized schedules for smart crop cutting experiments to speed up the measurement of agricultural yield in villages, as well as digitization of land records for faster assessment/settlement of claims and to ease implementation of the new crop insurance scheme. However, using these instruments effectively has been hampered by delays and quality issues of yield data to assess damages (Gulati, Terway, and al Hussain 2018). Given India's disproportionate increase in smallholder farming, a big push for outreach programs—including the use of technological advances more effectively and comprehensively to better target services—is needed to develop farmers' awareness of and interest in crop insurance, as well as greater confidence that crop damage will be covered adequately by insurance schemes.

[8] The 2011 Findex also found that 7% of agricultural workers had personally paid for crop/rainfall/livestock insurance. (This question was not asked again in the 2014 round.)

6.2.3 Distributional Trends for Institutional Credit Growth in Agriculture

Institutional credit to agriculture has been growing rapidly over the last few decades. However, looking more closely at institutional borrowing within rural areas and for cultivator households specifically (using the nationally representative All-India Debt and Investment Survey, conducted roughly every 10 years), we see that the proportion of institutional loans among cultivators, relative to borrowing from all sources, rose until the early 1980s but has flattened/declined somewhat since then (Figure 6.8). Between 1951 and 1981, for example, the share of agricultural credit from institutional sources rose from about 10% to 63%, rising further to about 67% by 2018–2019. In turn, the share of borrowing from noninstitutional sources, including moneylenders and family/friends, has hovered at a little higher than one-third over the last few decades.

Figure 6.8: Share of Credit for Agriculture (Loans Outstanding) for Cultivator Households, by Institutional/Noninstitutional Source



Source: National Statistical Office, All-India Debt and Investment Survey, multiple rounds.

To understand better what might be driving these trends, Table 6.1 provides additional breakdowns across different types of institutional and noninstitutional sources, as well as rural occupations. We find that of the cultivator households borrowing from noninstitutional sources in 2019, more than the majority sought credit from informal moneylenders. The continued large share of rural borrowing from noninstitutional sources of credit poses a major concern for policymakers, since noninstitutional sources such as moneylenders perpetuate indebtedness among poor people by providing easy credit at very high interest rates (20% or greater, according to the All-India Debt and Investment Survey, compared to 6%–15% among institutional sources). Table 6.1 also shows that farming households borrowing from institutional sources are much more likely to rely on banks, whereas non-cultivator households tend to rely equally on banks and self-help groups (SHGs). These statistics, however, mask differences in borrowing across the distribution of assets (within cultivators, for example, across small versus larger farmers), which we turn to next.

Table 6.1: Percentage Distribution of Rural Households' Cash Loans Across Institutional and Noninstitutional Sources, by Cultivator/Non-Cultivator Status

	2019		
	Cultivator	Non-Cultivator	Total
Borrowing from Institutional Sources	**67.0**	**63.9**	**66.1**
Of which:			
Scheduled commercial bank	42.6	40.4	41.9
Regional rural bank	7.2	2.3	5.7
Cooperative society/bank	5.3	2.9	4.6
Cooperative bank	5.1	5.7	5.3
Insurance companies	0.1	0.2	0.1
Provident fund	0.0	0.0	0.0
Employer	0.0	0.2	0.1
Financial institution	1.9	2.0	1.9
NBFCs including MFIs	1.5	3.3	2.0
Self-help group (bank linked)	2.6	5.6	3.5
Self-help group (non-bank linked)	0.3	0.5	0.4
Other institutional agencies	0.4	0.7	0.5

continued on next page

Table 6.1: ***Continued***

	2019		
	Cultivator	Non-Cultivator	Total
Borrowing from Noninstitutional Sources	**32.9**	**36.1**	**33.8**
Of which:			
Landlord	0.9	1.7	1.1
Agricultural moneylender	6.6	5.6	6.3
Professional moneylender	16.0	17.6	16.5
Input supplier	0.4	0.1	0.3
Relatives and friends	6.5	7.7	6.8
Chit funds	0.1	0.3	0.2
Market commission agent/traders	0.6	0.4	0.6
Others	1.8	2.5	2.0

MFI = microfinance institution, NBFC = nonbanking financial company.

Source: All-India Debt and Investment Survey 2019.

Overall, smaller farmers still face gaps in accessing institutional credit. Despite the expansion of institutional credit to agriculture, small and marginal farmers (those with landholdings of less than 2 hectares) continue to be crowded out from institutional lending because of their risk profile (lower collateral, land titling difficulties, etc.), lack of financial literacy, and the time and monetary costs of setting up bank accounts and seeking loans in hard-to-reach areas. Borrowing by small and marginal farmers is focused on crop loans of small loan size (in 2016, three-quarters of loans among this group were for crop-related purposes)—in March 2016, around 74% of the crop loan accounts of small and marginal farmers were only up to ₹100,000 (Raghumanda, Shankar, and Singh 2017). Data from the Reserve Bank of India's statistical returns also shows that large agricultural loans have grown faster over the last few decades and that the share of lending for smaller loans has shrunk over time, potentially crowding out financing needed by small and marginal farmers.

6.3 The Role of Institutional Borrowing in Agricultural Investments Across the Landholding Distribution: Evidence from the India Human Development Survey

Farmers borrow for a variety of reasons, including to purchase inputs or capital stock to sustain or accelerate agricultural production and to smooth consumption. In India, the empirical literature has shown that agricultural credit has had a positive impact on outcomes for farmers, although the links between borrowing and agricultural income depend on factors including targeting/landholding size, product design, and the mode of credit delivery. Most of these studies have been based on an examination of aggregated (district/state-level) data. An early district-level analysis by Binswanger and Khandker (1995), for example, found that formal credit through banks substantially improved investments in fertilizers and in larger machinery but had a more modest effect on output; this finding was mirrored by a more recent state-level panel analysis conducted between 1995–1996 and 2011–2012 (Narayanan 2016), which found that input use is sensitive to credit flow but has not translated into an increased share of GDP in agriculture.[9] Concerns persist over the low technical efficiency and productivity of input use, which are also tied to the increased fragmentation of landholdings discussed earlier and to the difficulties in extending credit effectively to smaller farmers (also see Ramakumar and Chavan [2014] and Golait [2007]).

Household survey data with information on the source, amount, and purpose of borrowing, complemented with detailed agricultural modules on production and investment, are needed to better understand the channels connecting borrowing to agricultural outcomes and to provide greater insight into how the effectiveness of credit is related to the distribution of household landholdings. Panel data are particularly useful in understanding how borrowing has been associated with changes in agricultural outcomes for the same households. In this section, we use the 2004–2005 and 2011–2012 rounds of the nationally representative India Human Development Survey (IHDS) to understand the extent to which borrowing has been associated with increased expenditure on seeds and fertilizer, as well as

[9] The time period and context of the study may matter as well—a dynamic panel analysis across 20 states over a shorter period, between 2001 and 2006, found that direct credit to agriculture has improved state-level output (Das, Senapati, and John 2009).

the resulting association with farm production and income. Although recent panel survey data are not available, the results do show that borrowing for agriculture is associated with higher agricultural investments, as well as an increased area under irrigation and greater crop income, reflecting important connections for future policy design. Borrowing for other purposes, including consumption, does not have any significant indirect effect on farm income. The effects on agricultural investment and production, however, tend to be concentrated on larger landowners, reflecting previously discussed gaps in targeting of smaller farmers.

6.3.1 Data

The IHDS is a nationally representative, multi-topic survey of 41,554 households across rural and urban areas in India.[10] The first round of interviews was completed in 2004–2005, and a second round of IHDS reinterviewed most of these households in 2011–2012 (a sample size of 42,152).[11] Along with employment and demographic characteristics of individual household members, the IHDS includes detailed modules on different sources of income, work in agriculture (including, for crops specifically, landholdings, production and receipts across different crops, and expenses on inputs and capital), and borrowing/debt.

Regarding borrowing in particular, the IHDS asks about whether households have borrowed from different institutional and noninstitutional sources (banks/government, microfinance/SHGs, moneylenders, an employer, friends/relatives, or other sources) and how many loans have been taken in the last 5 years, as well as about characteristics of the largest loan taken in the last 5 years (amount, purpose, source, interest rate, and repayment status).

Table 6.2 presents the distribution of landholdings among cultivators in the 2004–2005 and 2011–2012 rounds. Consistent with the national trends presented in section 6.2, the large majority (about 60% in 2004–2005 and 68% in 2011–2012) were very small farms, with landholdings of 2 acres or less.

[10] Specifically, the sample covered 1,503 villages and 971 urban localities across the country.

[11] IHDS-II reinterviewed about 83% of the IHDS-I households, as well as any split households that resided in the same community. The attrition rate is therefore about 17%, which is relatively low compared to other nationally representative household surveys over the same number of years (see Hao, Wang, and Xie 2014). In addition, the IHDS design includes a component to check the randomness of the panel component with a new random sample of villages. Sampling weights are used in all summary statistics.

Table 6.2: Share of Households Across the Distribution of Landholdings

	2004–2005		2011–2012	
	Mean	SD	Mean	SD
Share of Cultivators	0.45	[0.50]	0.45	[0.50]
Among Cultivators:				
HH agr land: 0.05<= x <=0.5 acre	0.21	[0.41]	0.27	[0.44]
HH agr land: 0.5< x <=1 acre	0.19	[0.39]	0.21	[0.41]
HH agr land: 1< x <=2 acres	0.21	[0.40]	0.20	[0.40]
HH agr land: 2< x <=4 acres	0.19	[0.39]	0.17	[0.37]
HH agr land: 4< x <=10 acres	0.15	[0.36]	0.12	[0.32]
HH agr land: >10 acres	0.05	[0.23]	0.04	[0.19]
Number of Households	**41,554**		**42,152**	

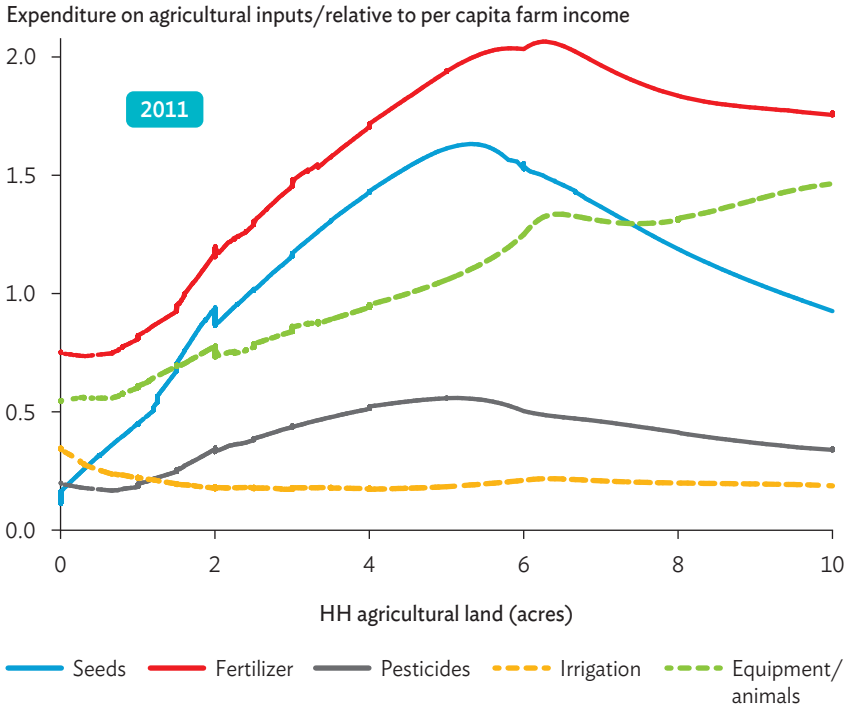
HH = household, SD = standard deviation.

Source: India Human Development Survey (2004–2005, 2011–2012).

Although the share of cultivators remained the same across rounds (45%), the distribution of landholdings changed somewhat, with average landholdings shrinking over the period. In the 2004–2005 round, for example, 21% of cultivating households were at the lowest end of the landowning distribution (between 0.05 and 0.5 acres); by 2011–2012, this group made up 27%. The share of households at the higher end of the landowning distribution also shrank during this period, although not by as large a margin.

The share of expenditure in agricultural inputs, relative to per capita farm income, also increases substantially with landholding size (Figure 6.9), particularly for seeds, fertilizer, and equipment/animals. This share then tapers off for larger landowners with land holdings of 4 or more acres. Smaller farms therefore use relatively low amounts of productivity-enhancing inputs and hence might benefit if credit for agriculture is strengthened. However, small farms are also likely to be qualitatively different—more labor-intensive (thus substituting land or other inputs for capital), for example. Interestingly, expenditure on irrigation did not appear to be associated with landholding size.

Figure 6.9: Cultivators: Expenditure on Agricultural Inputs, Relative to per Capita Farm Income, by Landholdings



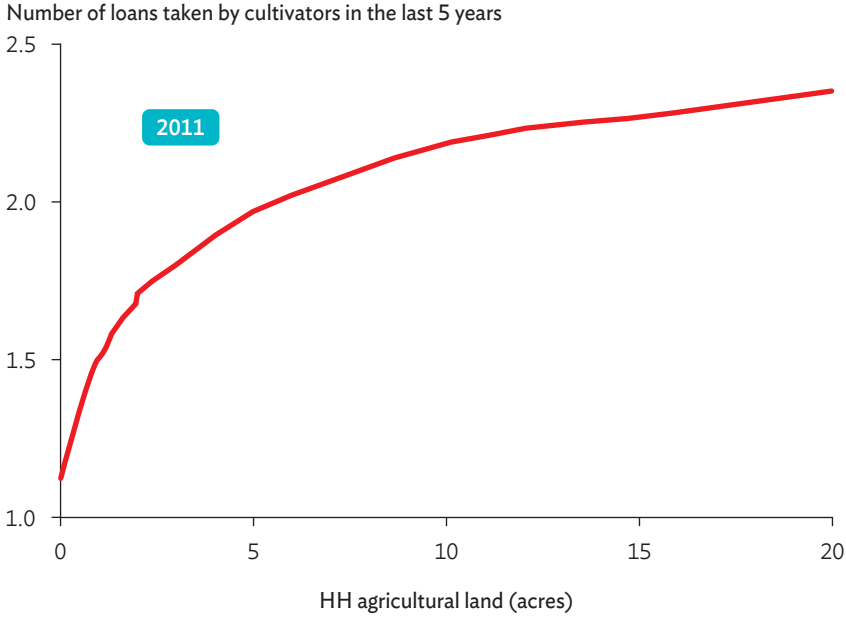
HH = household.

Notes: Locally weighted regressions, bandwidth = 0.8. Twenty acres was in the 99th percentile of agricultural land holdings in the data.

Source: India Human Development Survey, 2011–2012 round.

The IHDS also shows that the majority of cultivator households across the distribution of landholdings had borrowed in the last 5 years. Among cultivators in the lowest landholding category (0.5–5 acres), 53% had taken out a loan in the last 5 years; this increased to 70% for the highest three landholding categories. Figure 6.10 presents the average number of loans taken in the last 5 years, which ranged from about one to two loans and increased with landholdings as well.

Figure 6.10: Cultivators: Number of Loans Taken in the Last 5 Years, 2011 Round



HH = household.

Notes: Twenty acres was in the 99th percentile of agricultural land holdings in the data. Locally weighted regressions, bandwidth = 0.8.

Source: India Human Development Survey, 2010–2011 round.

Table 6.3 also presents results consistent with the supply-side data discussed in section 6.2 and above in section 6.3—among cultivator households borrowing for agriculture, banks constituted the most common institutional source.[12] At the same time, informal sources such as moneylenders and family/friends were also common, particularly among the smallest farmers. For cultivators with landholdings of between 0.05 and 0.5 acres, for example, 32% borrowed from banks, 30% from family/friends, and 21% from moneylenders. As expected, the reliance on banks as opposed to other institutional/noninstitutional sources grew with landholding size.

[12] The IHDS combined cooperative banks, SCBs, and RRBs together in one category.

Table 6.3: Source of Borrowing in Agriculture: Largest Loan Taken in the Last 5 Years, 2011–2012

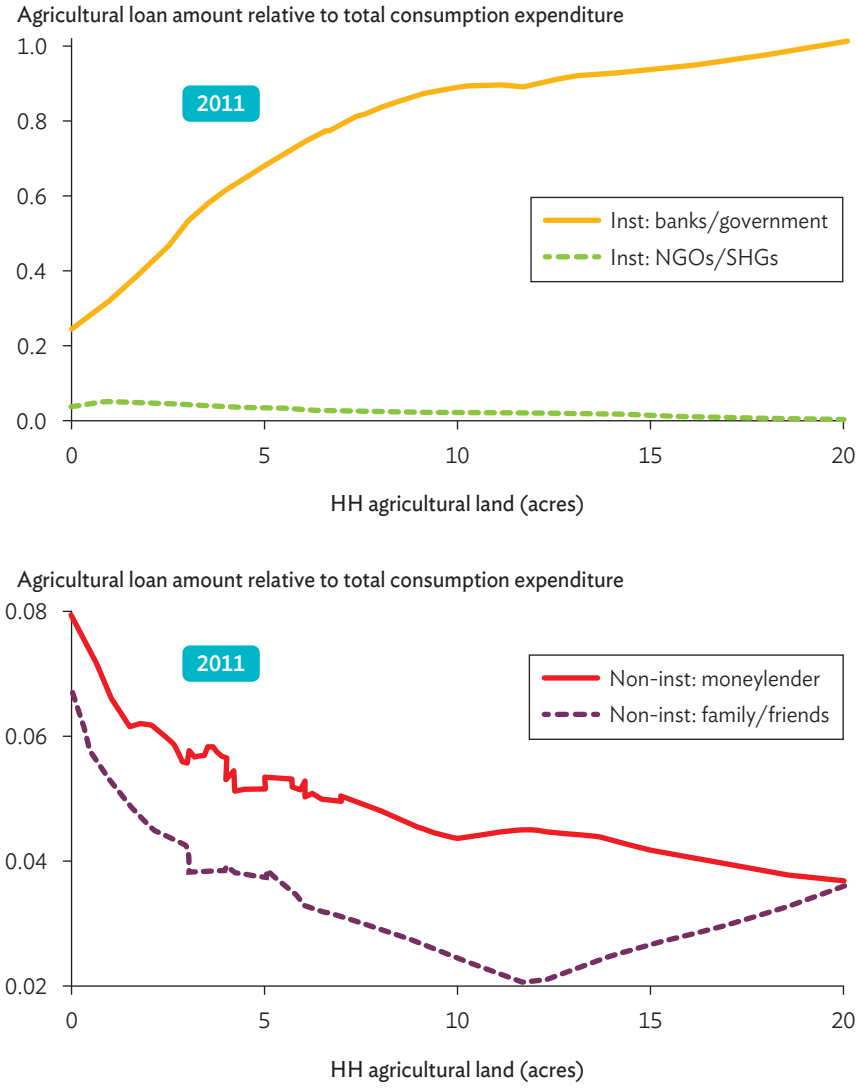
	HH Agricultural Land Holdings (x) Among Those Borrowing for Agriculture (largest loan in last 5 years in 2011):					
	0.05<= x <=0.5 acres	0.5< x <=1 acres	1< x <=2 acres	2< x <=4 acres	4< x <=10 acres	>10 acres
Share of Borrowing Households:						
Institutional/Formal Sources						
Banks	0.32 [0.47]	0.49 [0.50]	0.50 [0.50]	0.60 [0.49]	0.70 [0.46]	0.73 [0.45]
Government	0.02 [0.15]	0.06 [0.24]	0.12 [0.32]	0.13 [0.19]	0.11 [0.31]	0.14 [0.35]
NGOs	0.05 [0.22]	0.04 [0.20]	0.05 [0.21]	0.04 [0.19]	0.02 [0.15]	0.03 [0.17]
SHGs	0.09 [0.28]	0.07 [0.25]	0.04 [0.19]	0.02 [0.14]	0.02 [0.15]	0.01 [0.05]
Noninstitutional/informal sources						
Employers	0 [–]	0 [–]	0.01 [0.06]	0.01 [0.04]	0 [–]	0 [–]
Family/friends	0.30 [0.46]	0.24 [0.43]	0.18 [0.38]	0.13 [0.33]	0.07 [0.26]	0.03 [0.17]
Moneylenders	0.21 [0.40]	0.09 [0.29]	0.11 [0.31]	0.08 [0.26]	0.06 [0.24]	0.05 [0.23]
Total number of borrowing HH in agr:	**179**	**297**	**514**	**673**	**679**	**271**

HH = household, NGO = nongovernment organization, SHG = self-help group.

Source: India Human Development Survey, 2011–2012 round.

Reliance on SHGs for agricultural finance was small in the sample, although again, the smallest farmers were more likely than other landholding groups to participate in SHGs. Figure 6.11 reflects these differences, showing that among institutional borrowing, the average loan amount relative to total consumption expenditure increased with landholding size, while the opposite was true for noninstitutional borrowing. The ratio of loan amount to total consumption expenditure was also much higher for institutional than for noninstitutional loans.

Figure 6.11: Borrowing Amount in Agriculture, Relative to Total Consumption Expenditure, by Landowning Size



HH = household, NGO = nongovernment organization, SHG = self-help group.

Notes: Twenty acres was in the 99th percentile of agricultural land holdings in the data. Locally weighted regressions, bandwidth = 0.8.

Source: India Human Development Survey, 2011–2012 round.

6.3.2 Methodology

Using the panel of households across the two IHDS rounds, we first estimate a borrowing regression to understand which socioeconomic factors among cultivators affect borrowing for agricultural and nonagricultural purposes. We faced constraints to this empirical approach due to the setup of the questionnaires and the data; in each round, the IHDS asks about the characteristics of the largest loan taken in the last 5 years, not in the past year. As a result, looking at changes in characteristics of the largest loan between 2004–2005 and 2011–2012 will not be very informative, since the data from the first round will reflect borrowing before 2004–2005, and that loan will likely be different from the loan reported in the 2011–2012 round.

For each panel household I, we therefore pool both rounds and estimate borrowing and outcome equations using ordinary least squares (OLS). We first examine the initial (2004–2005) determinants, X_i^{2005}, of the largest loan taken in the 5 years before the 2011 round (ΔL_i^{2011}), since this loan would have also occurred between the two survey rounds:

$$L_i^{2011} = \alpha X_i^{2005} + \epsilon_i \quad (1)$$

We run separate equations for loans taken for agricultural and nonagricultural purposes. Initial-round household characteristics X_i^{2005} include gender and ethnicity/religion of the household head, education of adult men and women aged 15 years and older, whether the household is below the moderate poverty line,[13] construction and access to water and electricity, size of agricultural landholdings, and exposure to different types of shocks in the last 5 years. Understanding how initial household characteristics affect subsequent borrowing can help shed light on which communities or socioeconomic groups may need better targeted interventions. We estimate a household fixed-effects regression including state dummies interacted with time, accounting for clustering at the primary sampling unit level, and including state fixed effects interacted with survey year on the right-hand side.

[13] The IHDS calculated household poverty based on the household's monthly consumption per capita and the official Planning Commission poverty line as of 2005. The poverty line is based on 1970s calculations of income needed to support minimal calorie consumption and has been adjusted by price indexes every year; the poverty line also varies by urban/rural area.

For the same sample of cultivators, we then estimate the association[14] between changes in agricultural outcomes, y_{it}, over the period and characteristics of the largest loan, L_i^{2011}, taken for agricultural purposes in the last 5 years prior to 2011, controlling for the same initial household variables, X_i^{2005}. Specifically, outcomes, y_{it}, include variables available in the IHDS related to agricultural productivity and income, including landholdings under production (and/or irrigated), farm income, and share of expenditure on different types of inputs (seeds, fertilizer, pesticides, and equipment for irrigation and other purposes):

$$(y_i^{2011} - y_i^{2005}) = \gamma_1 L_{i1}^{2011} + \gamma_2 L_{i2}^{2011} + \beta X_i^{2005} + \epsilon_i \quad (2)$$

The loan characteristics above, L_i^{2011}, include a dummy, L_{i1}^{2011}, for whether the farming household borrowed for agriculture, as well as a variable, L_{i2}^{2012}, reflecting the loan amount relative to total household consumption expenditure. Overall, equation (2) allows us to examine how new, relatively large loans in agriculture have been associated with changes in outcomes over the survey period. As with the borrowing regression, we estimate equation (2) via OLS, accounting for community-level clustering and also state fixed effects.

6.3.3 Estimation Results

Determinants of borrowing. Table 6.4 presents findings from the borrowing regressions described in equation (1). We find that among cultivators, those borrowing for agriculture differ socioeconomically from those borrowing for nonagricultural purposes. Those borrowing for agriculture tended to have more years of education among men in the households, were less likely to be below the moderate poverty line, and had landholdings greater than 2 acres. Among those borrowing for nonagricultural purposes, these indicators went in the opposite direction, suggesting that these farming households were much more likely to be marginal or subsistence farmers with small landholdings and low income. Shocks experienced in the last 5 years also had different effects across the two groups—those borrowing for nonagricultural purposes were more likely to have experienced health and/or marriage shocks, whereas those borrowing

[14] In the absence of an exclusion restriction for household borrowing over the period, we broaden the scope to understand what systematic correlations—controlling for initial socioeconomic and geographic characteristics including shocks that affect borrowing—exist between characteristics of borrowing and agricultural outcomes.

for agriculture were more likely to have experienced climate or environmental shocks, such as crop failure and drought. Overall borrowing for different purposes was not fungible; only borrowing for agriculture specifically benefited agricultural investments and income. The results shown in Table 6.4 imply that larger landowners have benefited more from the expansion of agricultural credit.

Table 6.4: Ordinary Least Squares Regressions of Household Characteristics Associated with Borrowing

	Borrowed in the Last 5 Years (prior to 2011):	
	(1) Largest loan: in agriculture	(2) Largest loan: not in agriculture
Initial HH Characteristics from 2005:		
Sex of HH head: male	0.066*** [3.73]	0.016 [0.81]
Max years of schooling: men 15+	0.002*** [2.86]	-0.003** [-2.69]
Max years of schooling: women 15+	0.001 [1.18]	-0.001 [-1.30]
Below moderate poverty line	-0.023*** [-2.90]	0.018** [2.09]
House walls are brick/metal/stone/concrete	0.012 [1.50]	-0.002 [-0.31]
HH has indoor piped drinking water/tubewell	0 [0.01]	-0.021** [-2.41]
HH has grid electricity	0.035*** [2.87]	-0.007 [-0.55]
HH agr land: 0.05< = x <=0.5 acre	-0.058*** [-4.55]	0.017 [1.21]
HH agr land: 0.5< x <=1 acre	-0.017 [-1.08]	0.017 [1.64]
HH agr land: 2< x <=4 acres	0.044*** [3.37]	-0.045*** [-5.50]
HH agr land: 4< x <=10 acres	0.099*** [7.61]	-0.086*** [-8.30]
HH agr land: >10 acres	0.158*** [7.88]	-0.137*** [-15.11]
HH had large expenditure/loss (5Y): illness/accidents	-0.016 [-1.63]	0.105*** [9.53]

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Table 6.4: ***Continued***

	Borrowed in the Last 5 Years (prior to 2011):	
	(1) Largest loan: in agriculture	(2) Largest loan: not in agriculture
HH had large expenditure/loss (5Y): drought/flood/fire	0.019** [2.06]	0 [-0.00]
HH had large expenditure/loss (5Y): loss of jobs	-0.101*** [-6.20]	-0.008 [-0.51]
HH had large expenditure/loss (5Y): marriage	-0.019** [-2.53]	0.102*** [15.42]
HH had large expenditure/loss (5Y): crop failure	0.118*** [23.98]	-0.023** [-2.47]
HH had large expenditure/loss (5Y): death	-0.013 [-1.28]	-0.005 [-1.13]
Caste group: Hindu, high caste	-0.061 [-1.44]	0.089*** [2.90]
Caste group: Hindu, Other Backward Caste (OBC)	-0.032 [-0.77]	0.081* [1.85]
Caste group: Hindu, low caste	-0.071* [-1.75]	0.06 [1.31]
Muslim	-0.089* [-1.85]	0.058 [1.18]
Observations	11,055	11,055
R-squared	0.097	0.109

HH = household, Y = year.

Notes: Standard errors clustered at primary sampling unit level; robust t-statistics in brackets. *** p<0.01, ** p<0.05, * p<0.1. State fixed effects also included. Excluded category for HH agr. land: 1< x <=2 acre.

Outcome regressions. Table 6.5 shows that, controlling for other factors, borrowing for agriculture, as well as the share of loan amount relative to total expenditure, has a significant positive association with the share of agricultural expenditure on seeds, fertilizer, and pesticides. However, borrowing does not have a significant association with larger investments, such as expenditure on agricultural equipment. This finding may also be a function of the trends in agricultural lending discussed earlier in section 6.2, in which short-term loans for crops have been outpacing longer-term loans for capital investments.

Table 6.5: Ordinary Least Squares Regressions of Changes in Agricultural Outcomes (%) from Agricultural Borrowing

	Share of Total Agricultural Expenditure on:			
	(1) Seeds	(2) Fertilizer	(3) Pesticides	(4) Agricultural Equipment
Borrowed for Agriculture in Last 5 Years (prior to 2011)	0.7*** [2.98]	1.2*** [4.18]	0.5** [2.26]	0.5 [1.51]
Loan Amount in Agriculture/ Total HH Expenditure	0.4** [2.37]	0.5** [2.35]	0.1 [1.27]	0.2 [1.29]
Initial HH Chars (2005):				
Sex of HH head: male	0.3* [1.87]	0.4* [1.74]	0.4** [2.54]	0.6*** [4.52]
Max years of schooling: men 15+	0.03*** [2.96]	0.02* [1.92]	0.01 [0.94]	0.02 [1.63]
Max years of schooling: women 15+	−0.03 [−0.94]	0.005 [0.20]	−0.01 [−0.58]	−0.01 [−0.27]
Below moderate poverty line	−0.7*** [−5.45]	−0.6** [−2.21]	−0.4*** [−5.02]	−0.4*** [−3.14]
House walls are brick/metal/stone/ concrete	0.1 [0.41]	0.4 [1.20]	0.3 [0.80]	0.1 [0.14]
HH has indoor piped drinking water/ tubewell	−0.2 [−1.03]	1.0 [1.70]	−0.02 [−0.18]	0.1 [0.60]
HH has grid electricity	0.3 [1.49]	−0.1 [−0.36]	0.1 [0.77]	0.2* [1.80]
HH agr land: 0.05< = x <=0.5 acre	−0.7** [−2.39]	−0.6* [−1.91]	−0.5 [−1.53]	−0.8* [−1.94]
HH agr land: 0.5< x <=1 acre	−0.6** [−2.07]	−0.7** [−2.36]	−0.6 [−1.49]	−0.8* [−2.01]
HH agr land: 2< x <=4 acres	−0.3 [−1.19]	0.1 [0.83]	−0.3 [−0.88]	−0.5 [−1.18]
HH agr land: 4< x <=10 acres	0.4 [1.01]	1.0** [2.75]	−0.1 [−0.21]	0.3 [0.53]
HH agr land: >10 acres	2.6*** [4.79]	3.4*** [2.83]	0.8** [2.11]	1.1 [1.49]
HH had large expenditure/loss (5Y): illness/accidents	−0.5*** [−3.42]	−0.6*** [−2.96]	−0.2* [−1.86]	−0.4** [−2.64]
HH had large expenditure/loss (5Y): drought/flood/fire	1.0*** [2.79]	0.6 [1.46]	0.8 [1.07]	1.1 [1.35]
HH had large expenditure/loss (5Y): loss of jobs	0.02 [0.12]	0.001 [−0.00]	−0.4 [−1.40]	−0.8** [−2.30]
HH had large expenditure/loss (5Y): marriage	−0.2 [−1.58]	−0.4* [−1.91]	−0.1 [−1.02]	−0.5*** [−3.20]
HH had large expenditure/loss (5Y): crop failure	0.3* [2.04]	0.04 [0.20]	0.4** [2.14]	0.6** [2.61]
HH had large expenditure/loss (5Y): death	−0.1 [−0.62]	0.2 [1.28]	−0.1 [−0.67]	−0.03 [−0.18]
Observations	**11,016**	**11,016**	**11,016**	**10,004**
R-squared	**0.042**	**0.054**	**0.013**	**0.013**

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Table 6.5: ***Continued***

	Share of Agricultural Land:		Percentage Change in per Capita Farm Income:	
	(5) Under production	(6) Under production and irrigated	(7) Total	(8) From Crops
Borrowed for Agriculture in Last 5 Years (prior to 2011)	0.5 [1.36]	2.5** [2.49]	−2.3 [−0.59]	8.2** [2.69]
Loan Amount in Agriculture/ Total HH Expenditure	−0.8*** [−3.32]	−0.1 [−0.22]	−0.1 [−0.19]	0.2 [0.21]
Initial HH Chars (2005):				
Sex of HH head: male	−4.9*** [−3.31]	1.1 [0.65]	−49.4 [−0.70]	−62.1 [−0.71]
Max years of schooling: men 15+	−0.1 [−0.94]	0.02 [0.17]	0.4 [1.10]	0.00 [0.03]
Max years of schooling: women 15+	−0.1** [−2.60]	−0.2** [−2.63]	−1.1 [−0.90]	−1.3 [−0.99]
Below moderate poverty line	1.2** [2.41]	−0.8 [−1.61]	26.2 [1.19]	25.3 [1.15]
House walls are brick/metal/stone/concrete	−0.9** [−2.08]	−2.3** [−2.37]	−5.3 [−0.89]	3.7 [1.24]
HH has indoor piped drinking water/tubewell	−0.2 [−0.63]	−1.7*** [−3.34]	5.2 [0.58]	0.2 [0.06]
HH has grid electricity	0.5 [0.56]	−0.6 [−0.34]	13.3 [1.37]	11.9 [1.32]
HH agr land: 0.05<= x <=0.5 acre	−2.7** [−2.35]	−2.3 [−1.51]	32.6 [1.62]	35.2* [1.71]
HH agr land: 0.5< x <=1 acre	−2.4*** [−3.17]	−3.8** [−2.71]	−9.8 [−1.27]	−6.8 [−0.97]
HH agr land: 2< x <=4 acres	0.9* [1.93]	0.04 [0.05]	9.3 [1.14]	0.7 [0.24]
HH agr land: 4< x <=10 acres	2.7*** [3.83]	3.2** [2.65]	14.2 [1.30]	2.6 [0.62]
HH agr land: >10 acres	6.4*** [5.04]	6.2*** [5.18]	13.3* [2.01]	16.3* [1.75]
HH had large expenditure/loss (5Y): illness/accidents	−0.1 [−0.19]	0.01 [0.01]	−10.1 [−1.39]	1.4 [0.49]
HH had large expenditure/loss (5Y): drought/flood/fire	−0.9 [−1.56]	−1.0 [−1.12]	14.9 [0.77]	−3.4 [−1.23]
HH had large expenditure/loss (5Y): loss of jobs	2.6 [1.38]	5.8** [2.65]	−6.5 [−0.88]	−3.3 [−0.99]
HH had large expenditure/loss (5Y): marriage	0.6* [1.85]	0.2 [0.44]	8.8* [1.81]	−0.3 [−0.12]
HH had large expenditure/loss (5Y): crop failure	0.4 [1.27]	2.4* [1.94]	−4.6 [−1.17]	−3.1 [−1.25]
HH had large expenditure/loss (5Y): death	−0.4 [−0.88]	−2.6*** [−4.43]	0.1 [0.01]	−8.3 [−1.41]
Observations	**10,687**	**10,687**	**10,434**	**9,494**
R-squared	**0.047**	**0.056**	**0.036**	**0.052**

HH = household, Y = year.

Notes: 1. Standard errors clustered at primary sampling unit level; robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.1. State and household ethnicity fixed effects also included.

2. Coefficients were multiplied by 100 to be interpreted as percentages.

Table 6.5 does show, however, that borrowing for agriculture improves the share of agricultural land under production and irrigation (as opposed to just land under production). This indicates that the increased expenditure on seeds, fertilizers, and pesticides from agricultural borrowing is being targeted or more effectively used in irrigated plots. Overall farm income, which can include allied activities such as livestock production, was not significantly associated with borrowing, but crop income specifically grew 8% more for those who borrowed than for those who did not. (As discussed earlier, agricultural borrowing in India is mainly targeted toward crops.)

The results in Table 6.5 also suggest that larger agricultural loans are linked with greater seed and fertilizer expenditure, although loan size had no significant effect on other outcomes. The coefficient estimates on landholdings across all agricultural outcomes also show that, controlling for other socioeconomic characteristics, cultivators with larger landholdings in 2005 tended to invest more in their agricultural holdings and also had greater shares of land under production/irrigated, as well as higher overall farm and crop income in 2011. Importantly, we also find that the fungibility of credit is not as relevant in this context—while nonagricultural borrowing has been suggested in other contexts as a way to improve farmers' incomes through indirect effects on consumption smoothing and fostering of farm-nonfarm linkages, Table 6.6 shows that borrowing for nonagricultural purposes has a strong negative association with input purchases and income and, in turn, that agricultural borrowing specifically raises agricultural outcomes.

Table 6.7 also shows that many of the positive outcomes of borrowing observed in Table 6.5 are concentrated among relatively larger landowners, specifically those with holdings greater than 2 acres. While agricultural borrowing has had a positive association with seeds and fertilizer purchases among small and marginal farmers, Table 6.7 shows that for larger landowners, borrowing (both overall as well as the amount of borrowing) has had a significant positive association with other input purchases, including pesticides and agricultural equipment, as well as with the area of land under production and irrigation. The positive link between borrowing and crop income observed in Table 6.5 also appears to come from the largest landowners (those with holdings greater than 4 acres), although the effect in Table 6.7 is weakly significant. Larger agricultural loans relative to consumption expenditure also tend to raise the share of expenditure on different inputs; these effects are robust but small in magnitude.

Table 6.6: Ordinary Least Squares Regressions of Changes in Agricultural Outcomes (%) from Nonagricultural Borrowing

	Share of Total Agricultural Expenditure on:				Share of Agricultural Land:		Percentage Change in per Capita Farm Income:	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Seeds	Fertilizer	Pesticides	Agricultural Equipment	Under Production	Under production and irrigated	Total	From crops
Borrowed for Nonagriculture in Last 5 Years (prior to 2011)	-0.9***	-1.4***	-0.6***	-0.7***	-0.2	-2.7***	-10.3**	-5.9**
	[-5.17]	[-5.17]	[-7.66]	[-5.64]	[-0.42]	[-4.11]	[-2.20]	[-2.43]
Loan Amount in Nonagriculture/ Total HH Expenditure	0.3***	0.6	0.1**	0.2**	0.1	1.1**	13.7	1.9
	[2.89]	[1.71]	[2.15]	[2.29]	[0.45]	[2.59]	[1.32]	[0.96]
Observations	11,016	11,016	11,016	10,004	10,687	10,687	10,434	9,494
R-squared	0.04	0.051	0.013	0.013	0.047	0.056	0.036	0.052

HH = household.

Notes:

1. Standard errors clustered at primary sampling unit level; robust t-statistics in brackets. *** p<0.01, ** p<0.05, * p<0.1. State and household ethnicity fixed effects also included.
2. Additional variables controlled for are the same as in Table 6.5; those coefficients available upon request.
3. Nonagricultural reasons for borrowing included for a business, consumption, education, marriage, and housing.
4. Coefficients were multiplied by 100 to be interpreted as percentages.

What types of borrowing are more strongly associated with agricultural outcomes? Table 6.8 examines the same regressions across different institutional and noninstitutional sources of borrowing and again examines separate effects by landowning category, since smaller/greater landholdings have a clear effect on the link between borrowing and outcomes. We ran regressions for each outcome variable separately for cultivators with (i) 2 acres of land or less, (ii) greater than 2 and less than or equal to 4 acres of land, and (iii) more than 4 acres of land.

Table 6.7: Ordinary Least Squares Regressions of Changes in Outcomes (%) from Household Borrowing for Agriculture, by Landowning Distribution

	Borrowed for Agriculture in Last 5 Years (prior to 2011)		Size of Loan (Share of Loan Amount to Total Expenditure)			
	Coeff.	T-stat	Coeff.	T-stat	Obs	R-squared
Outcome Regressions:						
(A) Share of total agricultural expenditure on:						
(1) Seeds						
(a) Land: <=2 acres	0.7*	[1.71]	0.2***	[4.50]	4,722	0.016
(b) Land: >2 and <= 4 acres	0.3	[1.50]	1.3***	[4.86]	2,589	0.065
(c) Land: >4 acres	0.5	[1.66]	0.6*	[1.83]	3,705	0.077
(2) Fertilizer						
(a) Land: <=2 acres	1.2***	[3.13]	0.3*	[1.79]	4,722	0.045
(b) Land: >2 and <= 4 acres	0.5	[1.40]	2.0***	[4.10]	2,589	0.068
(c) Land: >4 acres	0.7*	[1.95]	0.7**	[2.41]	3,705	0.067
(3) Pesticides						
(a) Land: <=2 acres	0.1	[0.15]	0	[1.04]	4,722	0.009
(b) Land: >2 and <= 4 acres	0.3***	[3.24]	0.5**	[2.51]	2,589	0.092
(c) Land: >4 acres	0.8***	[5.37]	0.3*	[1.82]	3,705	0.073
(4) Equipment						
(a) Land: <=2 acres	0	[0.05]	0	[0.67]	4,234	0.01
(b) Land: >2 and <= 4 acres	0.1	[0.97]	0.7***	[3.64]	2,393	0.055
(c) Land: >4 acres	0.7*	[1.91]	0.4	[1.65]	3,377	0.05
(B) Share of total agricultural expenditure on:						
(1) Under production						
(a) Land: <=2 acres	0.7	[1.43]	0	[-0.06]	4,390	0.051
(b) Land: >2 and <= 4 acres	1.2	[0.98]	0	[0.05]	2,590	0.055
(c) Land: >4 acres	-0.4	[-0.62]	-0.9***	[-2.96]	3,707	0.067

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Table 6.7: ***Continued***

	Borrowed for Agriculture in Last 5 Years (prior to 2011)		Size of Loan (Share of Loan Amount to Total Expenditure)			
	Coeff.	T-stat	Coeff.	T-stat	Obs	R-squared
(2) Under production and irrigated						
(a) Land: <=2 acres	1.1	[0.59]	2.1	[0.93]	4,390	0.061
(b) Land: >2 and <= 4 acres	4.0**	[2.23]	1.5	[0.89]	2,590	0.051
(c) Land: >4 acres	1.3	[1.05]	−0.4	[−0.91]	3,707	0.063
(C) Percentage change in per capita farm income:						
(1) Total income						
(a) Land: <=2 acres	9.1	[1.23]	−1.1	[−0.68]	4,384	0.058
(b) Land: >2 and <= 4 acres	−4.0	[−0.62]	−0.3	[−0.11]	2,470	0.034
(c) Land: >4 acres	−8.3	[−0.80]	0.9	[0.69]	3,580	0.013
(2) Income from crops						
(a) Land: <=2 acres	6.1	[0.88]	5.2	[1.23]	3,974	0.063
(b) Land: >2 and <= 4 acres	−1.4	[−0.55]	−0.6	[−0.61]	2,231	0.009
(c) Land: >4 acres	10.8*	[1.94]	−0.7	[−0.72]	3,289	0.009

Notes:

1. Standard errors clustered at primary sampling unit level; robust t-statistics in brackets. *** p<0.01, ** p<0.05, * p<0.1. State and household ethnicity fixed effects also included.
2. Additional variables controlled for are the same as in Table 6.5 (except for the landowning dummies); those coefficients available upon request.
3. Coefficients were multiplied by 100 to be interpreted as percentages.

We find that institutional borrowing from banks, particularly larger loans, is important. Borrowing from banks raises the share of smallholder landowners' agricultural expenditure on seeds and fertilizer and larger landowners' expenditure on all agricultural inputs. Other sources of borrowing also have some positive effects—for large landowners, bigger loans from SHGs and moneylenders also have a positive association with expenditure on agricultural inputs, and the same was true for larger loans from moneylenders and family/friends for smaller landowners. When looking at overall borrowing dummies and controlling for other factors, only borrowing from banks had a positive effect on investments among

large landowners; such borrowing also had a weakly significant positive effect on crop income. Overall borrowing from banks is also positively associated with area of land under production and irrigation for smaller farmers. Interestingly, however, the links between borrowing and investments in agriculture are stronger than the link between borrowing and overall income.

Table 6.8: Ordinary Least Squares Regressions of Changes in Outcomes (%) from Household Borrowing for Agriculture: Effects of Source of Borrowing, by Landowning Distribution

	Coefficient Estimates on Source of Largest Loan Taken in Last 5 Years in Agriculture:									
	Borrowed for Agriculture in Last 5 years (prior to 2011) (dummies):				Size of Loan (share of loan amount to total expenditure):					
	Banks/ Government		NGOs/SHGs		Banks/ Government		NGOs/SHGs			
	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat	Obs	R-sq.
Outcome Regressions:										
Share of total agr. expenditure on:										
(A) Seeds										
(1) Land: <=2 acres	−0.3	[−0.77]	−0.3	[−0.64]	0.2***	[9.57]	−0.1*	[−1.71]	4,722	0.015
(2) Land: 2–4 acres	0.2	[1.19]	−1.8***	[−2.82]	0.4**	[2.61]	3.4**	[2.19]	2,589	0.066
(3) Land: >4 acres	0.5**	[2.23]	0.5	[0.41]	0.2	[1.65]	2.8*	[1.97]	3,705	0.076
(B) Fertilizer										
(1) Land: <=2 acres	−0.4*	[−2.03]	−0.1	[−0.17]	0.3***	[2.90]	−0.2**	[−2.17]	4,722	0.038
(2) Land: 2–4 acres	0.3	[0.77]	−0.4	[−0.30]	0.8***	[4.10]	0.4	[0.84]	2,589	0.049
(3) Land: >4 acres	0.1	[0.20]	−1.3	[−1.10]	0.6**	[2.15]	1.5	[1.72]	3,705	0.068
(C) Pesticides										
(1) Land: <=2 acres	−0.3	[−0.87]	−0.4	[−1.02]	0	[1.51]	−0.1	[−1.47]	4,722	0.009
(2) Land: 2–4 acres	0.2	[1.09]	−0.2	[−0.57]	0.3	[1.64]	−0.1	[−0.84]	2,589	0.089
(3) Land: >4 acres	0.6***	[3.69]	−0.1	[−0.26]	0.1	[1.49]	1.5	[1.57]	3,705	0.066
(D) Equipment										
(1) Land: <=2 acres	−0.6	[−1.54]	−0.6	[−1.26]	0	[0.94]	0	[0.09]	4,234	0.01
(2) Land: 2–4 acres	0	[0.10]	−0.3	[−1.42]	0.4***	[4.10]	−0.1	[−0.50]	2,393	0.05
(3) Land: >4 acres	0.8	[1.48]	−0.6	[−1.28]	0.2***	[3.36]	0.9*	[1.83]	3,377	0.05

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Table 6.8: ***Continued***

	Coefficient Estimates on Source of Largest Loan Taken in Last 5 Years in Agriculture:									
	Borrowed for Agriculture in Last 5 years (prior to 2011) (dummies):				Size of Loan (share of loan amount to total expenditure):					
	Banks/ Government		NGOs/SHGs		Banks/ Government		NGOs/SHGs			
	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat	Obs	R-sq.
Share of total agricultural land:										
(A) Under production										
(1) Land: <=2 acres	1.1	[1.51]	−0.9	[−0.88]	−0.2	[−0.86]	−0.3	[−0.56]	4,390	0.051
(2) Land: 2–4 acres	0.4	[0.57]	4.0*	[1.81]	0.5	[0.83]	−2.5*	[−1.87]	2,590	0.056
(3) Land: >4 acres	−0.7	[−0.87]	−0.3	[−0.22]	−0.4***	[−3.20]	−0.4	[−0.20]	3,707	0.067
(B) Under production and irrigated										
(1) Land: <=2 acres	1.0	[0.82]	3.3	[1.65]	1.3*	[1.75]	−2.2*	[−2.05]	4,390	0.061
(2) Land: 2–4 acres	2.4**	[2.21]	−0.1	[−0.05]	1.4	[1.41]	1.2	[0.35]	2,590	0.05
(3) Land: >4 acres	0.8	[0.57]	3.3	[0.98]	0	[0.05]	0.3	[0.18]	3,707	0.063
Percentage change in per capita farm income:										
(A) Total income										
(1) Land: <=2 acres	8.5	[0.95]	−0.2	[−0.07]	0	[0.03]	−0.5	[−0.15]	4,384	0.058
(2) Land: 2–4 acres	−7.4	[−0.80]	−6.4	[−1.02]	−0.9	[−0.67]	−2.0	[−0.41]	2,470	0.034
(3) Land: >4 acres	14.2	[1.47]	0.1	[0.02]	4.3	[0.72]	3.4	[1.33]	3,580	0.014
(B) Income from crops										
(1) Land: <=2 acres	2.8	[0.42]	−1.2	[−0.44]	7.8	[0.90]	−0.9	[−0.21]	3,974	0.063
(2) Land: 2–4 acres	−0.6	[−0.20]	−7.8	[−1.66]	0.5	[0.57]	1.8	[0.32]	2,212	0.009
(3) Land: >4 acres	9.6	[1.60]	−1.9	[−0.61]	−0.6	[−1.65]	−0.5	[−0.04]	3,267	0.009

NGO = nongovernment organization, SHG = self-help group.

Notes:

1. Standard errors clustered at primary sampling unit level; robust t-statistics in brackets.
   *** p<0.01, ** p<0.05, * p<0.1. State and household ethnicity fixed effects also included.
2. Additional variables controlled for are the same as in Table 6.5 (except for the landowning dummies); those coefficients available upon request.
3. Coefficients were multiplied by 100 to be interpreted as percentages.

6.4 Conclusion

Institutional credit to agriculture in India has grown rapidly since the mid-2000s due to numerous policy shifts aimed at sustainably raising agricultural incomes through better investment in productivity-enhancing inputs like seeds, fertilizer, and machinery. However, growing policy concerns remain over the rapidly increasing share of small and marginal farmers in the national composition of operational holdings. Another policy concern relates to these small farmers' continued dependence on informal credit even as institutional borrowing becomes more common.

The onset of the COVID-19 pandemic heightened vulnerability among many smaller farmers, particularly within crop agriculture. Furthermore, the growth over the last decade in easier access to agricultural credit from formal banks, while far-reaching, has also typically been focused on larger loans, and the spread of agricultural debt waiver policies across the country has actually induced many banks to shift away from districts with greater risk by allowing these banks to clean their books of consistently underperforming or nonperforming loans and move on to better-off districts.

Both the supply- and demand-side analyses presented in this chapter show that success in targeting small and marginal farmers has been mixed, that farmers who borrow for agriculture tend to be larger, wealthier, and with better access to electricity and other infrastructure, and that the link between borrowing and agricultural input investments has been stronger for larger farmers.

One important takeaway from the analysis in this chapter is the need to better understand the constraints faced by smaller farmers and the institutional lenders that may target this population. Due to smaller farmers' higher risk profiles, financial institutions face higher transaction costs in terms of appraising borrowers and monitoring and collecting loans. Therefore, ways to reduce these transaction costs constitute another important area for policymakers to address going forward. Such methods could include facilitating credit through other local institutions such as NGOs and input dealers to which farmers are tied (Golait 2007) and considering complementary initiatives—such as weather insurance and agricultural extension services—to help foster better monitoring of local agricultural conditions and to improve smaller farmers' ability to respond to fluctuations in rainfall and prices.

Such complementary initiatives can also help connect the role of lending for purchases of agricultural inputs—for which we observed a strong association in the IHDS data—with actual improvements in output and income, for which there was weaker evidence, consistent with other district- and state-level analyses (Binswanger and Khandker 1995; Narayanan 2016). Technical assistance for smaller farmers will be important in helping ensure that credit for agriculture is effective for raising productivity.

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CHAPTER 7

How Mobile Technology Can Support Agricultural Finance: Evidence from Sub-Saharan Africa

Shahidur R. Khandker, Hussain A. Samad, and Gayatri B. Koolwal

7.1 Introduction

This chapter deals with the agricultural finance issues in the sub-Saharan Africa (SSA) region. The discussion on SSA is important because (i) it is still one of the predominantly agricultural and subsistence economies and one with the highest share of smallholders in agriculture, (ii) the region witnessed a huge growth in mobile phone penetration, and (iii) it is where mobile financial services took off commercially and in a big way for the first time. SSA is home to some 1.2 billion people who are mostly smallholders, managing 80% of the region's farmland. The agrarian economy is largely subsistence, so large investments are necessary for transforming and commercializing subsistence agriculture and enhancing overall productivity and growth in support of sustainable growth and development.

One possible way to promote private investment in agriculture and make it commercialized from its subsistence level is to support both short- and long-term financing of farming, agro-processing, and related supply chains of agriculture. The role of credit, for example, in supporting agriculture has been of major policy interest in many developing countries. However, due to the increased risks in financing smallholder agriculture, formal and semiformal institutions' lending portfolios tend to be skewed toward nonagricultural activities, even in predominantly rural settings. Because of the poor business operations of the existing financial institutions, financing agriculture to support commercialization and promote private investment in agriculture is a big challenge in SSA.

While agricultural finance in the region has its challenges, SSA has a high penetration of mobile phones; mobile phone ownership is 93%.

The region also experienced high growth in mobile money accounts—42% of farmers in SSA own mobile money accounts, compared to 15% in South Asia (SAR) and 12.9% in East Africa and the Pacific (EAP). Hence, digitizing financial services with the help of mobile technology may be a way to move forward.

Little is understood about the role of agricultural credit expansion via mobile technology in rural settings to promote rural households' welfare, including a country's food security. This knowledge gap is particularly pronounced in SSA, where economic activity is dominated by agriculture and access to institutional finance is the lowest in the world, but the penetration of mobile technology is among the highest in the world. As such, it is important to examine the roles of different types of financial services in improving agricultural productivity in some key countries such as Ethiopia and Uganda.

Modernizing subsistence or smallholder farming through higher-quality agricultural inputs, better techniques, and better access to institutional finance has been a priority of the governments in SSA. Given that medium and small farmers dominate agricultural activity in the region, boosting agricultural productivity through financing requires a clearer understanding of how such financing can help alleviate the constraints these farmers face, including greater vulnerability to shocks. Institutional data analysis carried out in a few SSA countries shows that semiformal/microcredit institutions that offer complementary investments, such as technical assistance to smallholder farmers, have more successfully reached rural households and have also been more profitable. These additional services, such as extension services and training on the use of inputs, may improve clients' performance and, thus, their ability to repay loans.

Our findings from the SSA region show that financial institutions that specialize in small savings and lending and have strong local roots, such as cooperatives, are better suited to delivering agricultural finance on a sustainable and cost-effective basis. VisionFund and BRAC Uganda, two of the largest rural microfinance institutions in Uganda, are examples of this success. Leveraging mobile banking and other technologies may contribute to solving market information deficiencies and delivering financial services in a more cost-effective manner.

A review paper on rural and agricultural finance in SSA shows that there are many attempts in the region to design and implement projects covering credit, savings, payments, and insurance interventions (Biscaye et al. 2015). The report reviews some 19 studies that evaluate the impact of such interventions on a number of household-level outcomes such as consumption, income, production, food security, and resilience. There is clear evidence that while the take-up for financial products varies, those positively associated with household welfare are provision of agricultural products such as credit, savings (individual versus group savings schemes), payments (including remittance and transfers), and insurance. Several index-based weather insurance programs were introduced in the region in recent years to help farmers address the related risk constraints they face, but the take-up has been low, so it is difficult to evaluate their effectiveness. Nonetheless, it is an important policy concern to determine what works, how it works, and what it means for policymaking vis-à-vis leaving financial markets to operate independently and to determine the user patterns and welfare implications of these financial products.

7.2 Farmers' Access to Finance in Sub-Saharan Africa vis-à-vis Other Regions: What Does the Global Findex Data Say?

Access to agricultural finance means access of farmers to financial services such as credit, savings, payments, remittance transfers, and insurance provided by alternate financial systems. There are four major financial systems available in the developing world: banks, credit unions, microfinance institutions (MFIs),[1] and mobile financial systems. While the first three categories refer to systems with physical outlets, a mobile financial system uses internet or mobile phone technology to carry out the same services fast and mostly through cashless transactions.

Before we compare financial outcomes in SSA with those in other regions, it is useful to examine the data of major development indicators as presented in Table 7.1. Developing countries, excluding Organisation for Economic Co-operation and Development (OECD) countries, can be grouped into six regions: East Asia and the Pacific (EAP), South Asia (SAR), Europe and

[1] MFIs may also include registered rotating savings and credit associations (ROSCAs).

Central Asia (ECA), Middle East and North Africa (MENA), Latin America and the Caribbean (LAC), and sub-Saharan Africa (SSA). As shown in Table 7.1, per capita gross domestic product (GDP) is highest in EAP, followed by that in ECA, LAC, MENA, SAR, and SSA. Thus, SSA is the poorest region of the world with a per capita GDP that is one-sixth of EAP's income, while SAR is the second-poorest region with almost one-fifth the income of EAP. Agriculture is the major source of income of the poorest region. A smaller share of agriculture in a country's GDP is a sine qua non for a modern economy with a higher level of economic and social development. Both SSA and SAR have been the regions with the highest share of agriculture GDP over the decade ending with 2021 (Figure 7.1). Agriculture accounted for some 18% of GDP in 2011 in both regions, which is also roughly the case after 10 years (2021). In contrast, in the more modern economy of EAP, agriculture accounted for less than 10% of GDP in 2011 and less than 8% of GDP in 2021. This GDP trend analysis shows that both SSA and SAR have been predominantly agricultural compared to other regions, and this has been the case over the last decade.

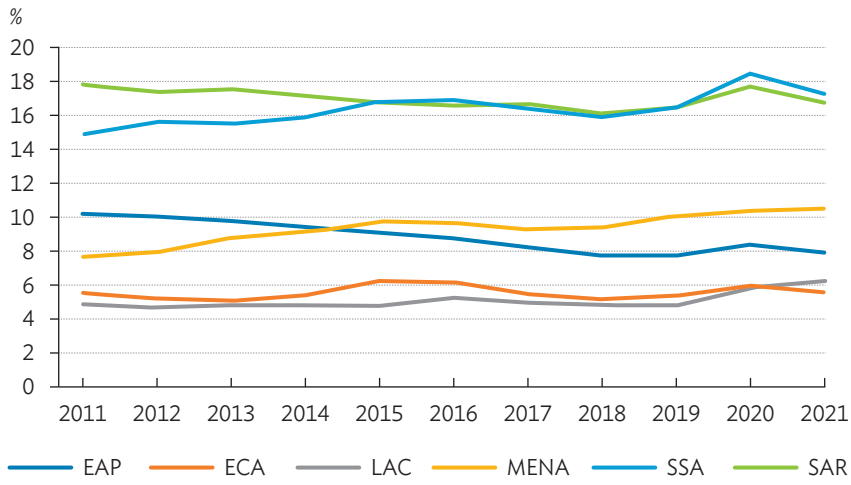
Table 7.1: Selected Development Indicators Across Regions, Excluding Organisation for Economic Co-operation and Development and High-Income Countries, 2021

	EAP	ECA	LAC	MENA	SAR	SSA
GDP (Constant $ billion)	20,752	3,517	4,585	1,490	4,089	1,919
GDP per capita (Constant $)	9,772	8,759	7,728	3,565	2,150	1,625
Share of agriculture in GDP (%)	7.9	5.6	6.3	10.5	16.7	17.3
Commercial bank branches per 100,000 adults	8.8	20.5	12.4	13.4	14.6	4.1
Depositors with commercial banks per 1,000 adults	...	1,266.9	773.2	...	...	263.1
Mobile phone subscriptions per 100 people	126.9	134.9	109.1	112.6	85.0	92.6

EAP = East Asia and the Pacific, ECA = Europe and Central Asia, GDP = gross domestic product, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SAR = South Asia, SSA = sub-Saharan Africa.

Source: World Bank data (data.worldbank.org).

Figure 7.1: Agriculture as a Share of Gross Domestic Product by Region (Excluding High-Income Countries)



EAP = East Asia and the Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SAR = South Asia, SSA = sub-Saharan Africa.

Source: World Bank (various years-a).

More interestingly, in terms of access to finance, formal financial institutions such as banks cover a larger population in more developed regions compared to the situation in SSA. For example, there are almost 9 commercial bank branches per 100,000 adults in EAP compared to only 4 branches per 100,000 people in SSA. But mobile phone density (number of phones per 100 adults) does not follow the income pattern. For example, the number of mobile phone subscriptions is 127 per 100 people in EAP, 85 in SAR, and 93 in SSA. Penetration of mobile technology in the income-poor and agrarian economy of SSA is a major phenomenon in mobile technology and hence, a source of hope for improvement in access to financial services in this poor economy.

Against this background, let us compare and contrast three rounds of financial data (from 2014, 2017, and 2021) of the World Bank's Global Financial Inclusion database, also known as the Findex. Farmers are defined as those who draw income from agricultural sources. We can compare and contrast the trend and distribution of households in different regions by three major indicators of financial inclusion—having an account (i.e., access to finance), borrowing funds, and saving.

By one definition, financial inclusion means the percentage of households having an account with any type of financial system—banks, credit unions, microfinance institutions (MFIs), or mobile money accounts. While banks, credit unions, and MFIs are treated as financial institutions, having a mobile financial account can be treated as having access to digital finance. Of course, financial institutions such as banks can also offer digital financial services (DFS) through the internet. There are many countries in the world such as the People's Republic of China and India that have already introduced DFS in various forms using alternate digital technology.

7.2.1 Farmers' Access to Finance

Access to finance among farmers across the developing regions increased from 37.9% in 2014 to 48.2% in 2017, and to 57.1% in 2021 (Table 7.2). This means an overall increase of 19 percentage points in financial access. In contrast, the corresponding figures for nonfarmers for the same years are 42.4%, 48.0%, and 58.7%, respectively, making for an increase of 16 percentage points during 2014–2021. That is, overall access to finance does not vary much between farmers and nonfarmers in the developing world.

Table 7.2: Access to Finance in Global Regions, Excluding Organisation for Economic Co-operation and Development and High-Income Countries

Access Indicators	EAP	ECA	LAC	MENA	SAR	SSA	All Regions
2014							
Has account (%)							
Farmers	58.6	36.1	47.3	19.5	41.4	29.3	37.9
Nonfarmers	60.9	46.4	44.5	21.4	40.1	30.4	42.4
Has account with financial institution (%)							
Farmers	57.1	36.0	46.1	19.5	40.2	21.8	33.8
Nonfarmers	60.0	46.3	43.8	21.3	39.6	26.2	41.0
Has MFS account (%)							
Farmers	4.7	0.2	5.3	0.7	3.0	15.9	11.6
Nonfarmers	2.9	0.5	1.8	0.8	1.6	9.4	4.7
N	12,204	20,037	16,536	6,007	9,132	34,044	105,520

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Table 7.2: ***Continued***

Access Indicators	EAP	ECA	LAC	MENA	SAR	SSA	All Regions
2017							
Has account (%)							
Farmers	48.0	59.0	57.6	35.5	57.7	42.7	48.2
Nonfarmers	58.0	59.0	48.6	33.4	52.6	39.3	48.0
Has account with financial institution (%)							
Farmers	46.9	58.6	52.2	35.4	56.2	29.1	40.7
Nonfarmers	57.3	58.8	46.6	33.1	50.8	28.3	44.2
Has MFS account (%)							
Farmers	5.3	13.8	13.5	0.4	8.2	30.2	21.3
Nonfarmers	7.2	4.8	5.9	1.0	4.9	23.4	11.6
N	13,833	23,062	16,504	14,145	8,704	35,000	112,248
2021							
Has account (%)							
Farmers	53.3	65.9	68.5	35.5	57.3	55.2	57.1
Nonfarmers	74.2	69.7	57.7	34.0	57.4	52.4	58.7
Has account with financial institution (%)							
Farmers	51.7	65.4	64.7	34.3	53.0	32.8	45.0
Nonfarmers	72.3	69.1	54.0	32.5	54.9	33.1	52.2
Has MFS account (%)							
Farmers	12.9	13.8	20.8	5.7	14.7	42.0	30.4
Nonfarmers	25.2	18.0	19.0	5.1	8.8	34.9	23.0
N	11,579	19,022	14,519	9,053	8,009	25,037	87,219

EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, MFI = microfinance institution, MFS = mobile financial services, SAR = South Asia, SSA = sub-Saharan Africa.

Notes:

1. Having an account indicates an institutional financial account (including MFIs), a mobile money account, or both.
2. Farmers are defined as those who have received agricultural payments during the last 12 months. Farmers were 32.7% of the population in 2014, 27.3% in 2017, and 16.7% in 2021 in developing countries.

Sources: World Bank Global Financial Inclusion database (Demirguc-Kunt et al. 2015; Demirguc-Kunt et al. 2018; Demirguc-Kunt et al. 2022).

Data reveals substantial variations in overall financial inclusion across regions. For example, in 2014, farmers with financial accounts amounted to 29.3% in SSA compared to 19.5% in MENA. The percentage for other regions was 41.4% in SAR, 36.1% in ECA, 47.3% in LAC, and 58.6% in EAP. In addition, rates vary substantially over years. For example, in 2021, 55.2% of farmers had a financial account in SSA compared to only 29.3% in 2014, meaning a gain of almost 26 percentage points during this period. Gains were also substantial in a few other regions—almost 16 percentage points in SAR compared to 30 percentage points in ECA. Meanwhile, in EAP, the trend was the opposite—a loss of 5 percentage points over the same period.

Variations in overall financial access across regions are due to variation in the type of accounts. For example, the decline in overall access in EAP is partly due to the decline (some 5 percentage points) in account ownership with financial institutions (from 57.1% in 2014 to 51.7% in 2021), although there is a gain of 8 percentage points in mobile money account ownership (from 4.7% in 2014 to 12.9% in 2021). The gains in account ownership in SAR are due to increases in ownership of both financial accounts (40.2% in 2014 against 53.0% in 2021) and mobile money accounts (3.0% in 2014 versus 14.7% in 2021) over the same period. In contrast, in SSA, gains in overall access to finance are due primarily to the increase in mobile account ownership. For example, account ownership with financial institutions increased by 11 percentage points (21.8% in 2014 against 32.8% in 2021) compared to a gain of 26 percentage points in mobile money account ownership (15.9% in 2014 against 42.0% in 2021) over this period. The findings show clearly a remarkable progress in the mobile money account ownership in the SSA region vis-à-vis other regions such SAR and EAP.

7.2.2 Farmers' Access to and Purpose of Institutional Borrowing

Another measure of access to finance is the extent of borrowing from institutional sources and the use of credit.[2] Access to credit is an important issue worth considering for determining the penetration of formal finance in agriculture in recent years. Having an account with any type of financial system is a measure of overall financial access. This access is expected to raise farm productivity and

[2] This is because not much is being borrowed through MFS; hence, borrowing from institutional finance by and large means borrowing from banks, credit unions, and MFIs.

welfare among smallholders in various ways because farmers can save, borrow, pay, and receive transfers using any type of financial account. Such financial transactions are essential for people to make efficient input–output decisions in farming or agro-processing. The relationship between access to finance and efficient decision making demonstrates whether financial inclusion (i.e., having an account with a financial institution or mobile money) helps farmers access credit, which can then help relax credit constraints perceived at the farm level for raising farm productivity and food security.

Table 7.3 shows that in 2014, 40.6% of farmers across all regions borrowed from any source, only 11.0% borrowed from financial institutions (banks, credit unions, and MFIs), and only 16.3% of borrowers used the money for agricultural purposes. In 2021, while 60.6% of farmers borrowed from any source, only 14.1% borrowed from financial institutions. This same pattern is also observed for nonfarmers. Thus, while access to finance has improved a lot over the years, the extent of borrowing from institutional sources has not as much, so the extent of borrowing from noninstitutional sources has remained an issue. The extent of borrowing has important implications for enhancing farm productivity and growth as well as food security.

Table 7.3: Borrowing in Global Regions, Excluding Organisation for Economic Co-operation and Development and High-Income Countries

Borrowing Indicators	EAP	ECA	LAC	MENA	SAR	SSA	All Regions
2014							
Borrowed (%)							
Farmers	53.6	52.1	52.9	62.9	50.3	65.1	40.6
Nonfarmers	45.2	37.1	36.6	44.5	38.9	45.8	58.7
Borrowed from financial institution (%)							
Farmers	19.4	13.5	18.1	5.6	10.3	6.7	11.0
Nonfarmers	14.3	12.0	11.9	7.5	6.7	5.4	9.6
Borrowed for farm/business (%)							
Farmers	16.7	8.2	6.5	9.9	12.7	19.8	16.3
Nonfarmers	7.2	2.2	17.5	4.1	5.1	7.2	5.3
N	12,204	20,037	16,536	6,007	9,132	34,044	105,520

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Table 7.3: ***Continued***

Borrowing Indicators	EAP	ECA	LAC	MENA	SAR	SSA	All Regions
2017							
Borrowed (%)							
Farmers	60.3	53.4	53.4	43.7	59.8	61.0	58.5
Nonfarmers	45.0	40.7	35.2	32.9	37.7	42.7	39.6
Borrowed from financial institution (%)							
Farmers	25.1	19.1	21.6	6.1	12.5	9.2	14.4
Nonfarmers	13.1	12.4	11.1	6.3	6.6	5.6	9.2
Borrowed for farm/business (%)							
Farmers	20.2	14.5	20.2	10.8	15.0	20.4	18.7
Nonfarmers	7.2	3.0	6.8	2.2	5.3	8.0	5.7
N	13,833	23,062	16,504	14,145	8,704	35,000	112,248
2021							
Borrowed (%)							
Farmers	54.0	51.8	54.3	51.3	60.1	67.0	60.6
Nonfarmers	48.2	45.3	41.2	46.1	44.5	49.4	46.0
Borrowed from financial institution (%)							
Farmers	19.2	19.2	16.8	5.3	14.4	10.9	14.1
Nonfarmers	16.0	14.8	11.1	4.6	8.9	6.9	10.6
N	11,579	19,022	14,519	9,053	8,009	25,037	87,219

EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SAR = South Asia, SSA = sub-Saharan Africa.

Notes:

1. Having an account indicates an institutional financial account (including MFIs), mobile money account, or both.
2. Farmers are defined as those who have received agricultural payments during the last 12 months. Farmers were 32.7% of the population in 2014, 27.3% in 2017, and 16.7% in 2021 in developing countries.
3. Information on borrowing for agriculture was not collected in 2021.

Sources: World Bank Global Financial Inclusion database (Demirguc-Kunt et al. 2015; Demirguc-Kunt et al. 2018; Demirguc-Kunt et al. 2022).

Although the extent of borrowing from institutional sources has not improved much over the years, some gains are observed in SAR and SSA. For example, institutional borrowing for farmers in SAR increased from 10.3% in 2014 to 14.4% in 2021. The corresponding shares of institutional borrowing in SSA are 6.7% in 2014 and 10.9% in 2021. The extent of scant access to institutional finance for farmers and nonfarmers alike is noteworthy. While more than 60% of farmers do borrow each year, only 10% of them borrow from institutional sources and some 20% of them actually borrow for agricultural purposes. Such a pattern also exists in other regions, except for EAP, where a larger percentage of farmers borrowed from institutional sources and for agricultural purposes. This discrepancy requires an examination of the country-level evidence as to why EAP, on average, does better than SAR and SSA in terms of access to institutional credit by farmers and use of finance in farming.

A growing number of recent studies, including those on sub-Saharan Africa, also highlight the role of microfinance institutions in providing access to finance and technical support. Using national data from Rwanda, for example, Ali, Deininger, and Duponchel (2014) find that having access to information through media and participating in networks such as farmers' cooperatives can reduce credit constraints significantly, which in turn can increase agricultural output by around 17%. From a randomized study in Mali, Beaman et al. (2014) find that compared to cash grants offered to randomly selected households in nonprogram villages, MFI agricultural loans boosted the purchase of agricultural inputs and farm profits for farmers with high returns to capital. However, their study also finds that take-up of the lending program remained low, indicating that other factors, such as motivation, may also be important to consider. In a recent study in Ghana, Quartey et al. (2012) argue that access to credit alone is not sufficient to boost agricultural production; agricultural profitability also needs to be improved through more efficient pricing and marketing of agricultural production to ensure that the loans actually boost productivity and that farmers do not end up in debt. Finally, in an ongoing randomized study, Bandiera et al. (2020) partner with BRAC in Uganda to understand how credit constraints and extension services, along with social networks and expectations about the returns to technology, affect technology adoption among women farmers.

7.2.3 Access to Mobile Finance in Sub-Saharan Africa vis-à-vis Other Regions

While a mobile money account facilitates certain useful transactions (e.g., sending money), it does not necessarily provide access to services such as credit unless it is linked with financial services of banks and MFIs. We can better understand whether mobile money accounts are providing access to such services by looking into the distribution of borrowers by alternative account ownership. Table 7.4 presents the distribution of account holders of different categories by the percentage of borrowers from institutional sources.

Table 7.4: Borrowing by Different Account Holders in Global Regions, Excluding Organisation for Economic Co-operation and High-Income Countries (2021)

Borrowing Indicators	EAP	ECA	LAC	MENA	SAR	SSA	All Regions
Borrowed (%)							
Mobile-money-only account holders	47.4	51.5	40.0	66.5	48.6	62.9	59.8
Institutional-only account holders	43.2	51.7	49.3	57.2	47.4	54.0	50.4
Both mobile and institutional account holders	58.0	66.8	66.2	67.4	65.1	74.5	68.7
Borrowed from financial institution (%)							
Mobile-money-only account holders	12.3	15.8	6.7	4.5	11.5	4.4	5.3
Institutional-only account holders	17.4	21.0	15.6	14.8	13.2	12.0	15.5
Both mobile and institutional account holders	25.5	29.4	20.6	19.6	19.2	21.4	22.7
N	4,452	4,909	7,133	3,396	4,782	14,726	39,407

EAP = East Asia and the Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SAR = South Asia, SSA = sub-Saharan Africa.

Notes:

1. Share of mobile-money-only accounts was 2.0% in 2014, 4.2% in 2017, and 7.1% in 2021; share of institutional-only accounts was 19.9% in 2014, 23.6% in 2017, and 24.0% in 2021; and share of both mobile and institutional accounts was 2.3% in 2014, 5.5% in 2017, and 10.5% in 2021.
2. Information on borrowing for agriculture was not collected in 2021.

Sources: World Bank Global Financial Inclusion database (Demirguc-Kunt et al. 2015; Demirguc-Kunt et al. 2018; Demirguc-Kunt et al. 2022).

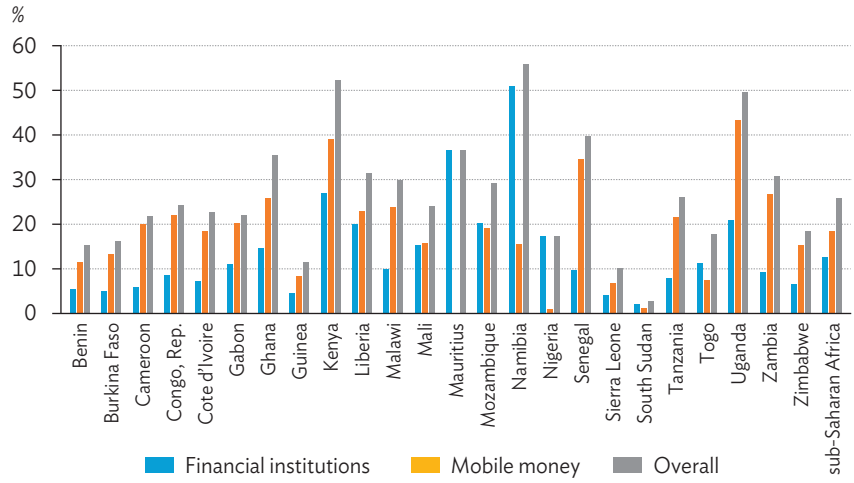
We consider three categories of account holders—mobile money only, institutional only, and both mobile money and institutional account-holders. Interestingly, those who have only mobile money accounts borrowed the least from financial institutions compared to those who had accounts with financial institutions only or with both mobile money and institutional accounts. For example, in 2021 in the developing countries, only 5.3% of mobile-money-only account holders borrowed from financial institutions against 15.5% among financial institution-only account holders and 22.7% among those having both mobile money and financial accounts. More importantly, even if SSA has the highest penetration of mobile financial technology, mobile-money-only account ownership did not help much to access institutional finance such as credit—only 4.4% of mobile-money-only account holders in SSA had access to institutional finance, compared to 11.5% in SAR followed by 12.3% in EAP. Thus, although mobile technology has facilitated certain types of financial services such as payments and remittance transfers, it has yet to support farmers' access to credit from institutional sources, which is highly desired for enhanced food security and productivity.

7.2.4 Access to Institutions for Savings Deposits

Access to credit is one of the major reasons for anyone to open an account with a financial institution such as a commercial bank, cooperative, MFI, or even a mobile money account. Saving money in a financial institution is a way to safeguard a household's economic security against any uncertainty due to economic and weather shocks. People want to save money in a reliable outlet that can be used in times of need and for smoothening income and consumption. Like other actors, farmers also need to save money with a reliable outlet. Thus, we would like to demonstrate the extent of savings behavior among farmers who save with financial institutions in SSA. Figure 7.2 demonstrates the incidence of savings among farmers in the countries of SSA and the region overall.

Figure 7.2 shows the extent of savings with financial institutions (banks, cooperatives, and MFIs) and with a mobile financial system. Three countries stand tall (Kenya, Namibia, and Uganda) in terms of farmers' savings deposits with financial systems. Namibia has the highest savings incidence, followed by Kenya and Uganda. One striking fact is that in Namibia, the savings deposits are the highest with financial institutions, followed by savings with a mobile money account.

Figure 7.2: Incidence of Savings by Farmers in Countries of Sub-Saharan Africa



Note: South Africa is excluded.

Source: World Bank Global Financial Inclusion database (Demirguc-Kunt et al. 2022).

This is in sharp contrast with the situation in Kenya and Uganda, where farmers save more with the mobile financial system than with financial institutions. This finding is exceptional in SSA, where most countries have savings deposits that are higher with financial institutions than with the mobile financial system. As Figure 7.2 suggests, in SSA, the incidence of savings with financial institutions is about 11% compared to some 19% with mobile money accounts. In contrast, the incidence of savings with mobile money accounts is some 43% in Uganda and 38% in Kenya against 20% in Cameroon and 28% in Zambia. Clearly, the role of mobile technology is an outstanding feature in these two countries (Uganda and Kenya) in the region.

7.2.5 Tales of Two Systems of Financial Inclusion from Two Countries in Sub-Saharan Africa

In order to understand the scope of recent progress in financial inclusion via mobile technology in the SSA region, we now highlight experiences of two major economies of the region using an in-depth country-level data analysis.

We use both macro- and micro-level data to demonstrate why and how farmers' access to finance differs and what it means to policymaking. The two selected countries, Ethiopia and Uganda, are contrasted and compared based on the in-depth analysis of firm-level survey data collected in recent years. We selected these two countries because data was available (at both the institutional and firm level) and because of the contrasting features of these two major economies in SSA—Ethiopia has a low level of MFS penetration while Uganda has high penetration, causing differences in the level of financial inclusion as reflected by the Global Findex data.

Above all, farmers' access depends heavily upon the government's policies and programs. Ethiopia represents an average SSA country while Uganda represents the other side of the financial system, countries with high penetration of mobile financial technology. In 2017, for example, only 35% of adults in Ethiopia reported having an account with a financial system, compared to 59.2% in Uganda and 41.5% in sub-Saharan Africa. Uganda represents the high end of financial access compared to Ethiopia and also against the average coverage of 49% in the developing world.[3]

How do the numbers differ between farmers and nonfarmers? As per the Findex of 2017, some 25.8% of individuals reported having received payments for agriculture in SSA as a whole, compared to 58.7% in Ethiopia and 49.8% in Uganda.[4] Thus, using this definition of farmers, we find that 33.2% of farmers in Ethiopia have an account with a financial institution (bank or microfinance institution), compared to 65.5% in Uganda and 42.7% in SSA as a whole. Interestingly, while 48.2% of Ethiopian farmers borrowed, only 13.6% of them managed to borrow from institutional sources and only 18.3% borrowed for agriculture/business purposes.[5]

Both access to formal credit and the use of borrowed funds for agricultural purposes appear to vary by financial market development.

3 The corresponding figure is 92% for the developed world.

4 The comparison between Ethiopia and Uganda is striking. Farmers are subsistent in both countries, but their extent of financial inclusion is higher in Uganda than in Ethiopia. Part of the reason for this trend is that farmers in Uganda carry out more transactions via mobile money accounts, while mobile banking was nonexistent in Ethiopia in 2017.

5 Note that financial inclusion among farmers in the developing world was 48.2% in 2017. Financial inclusion was the highest among farmers in ECA (59.0%) and lowest in MENA (35.5%).

In SSA, 61% of the farmers borrowed, but only 9.1% borrowed from formal sources and only 20.3% borrowed for agriculture. In contrast, in Uganda, some 76.6% of farmers borrowed, of which only 16.3% borrowed from formal sources and only 25.5% borrowed for agriculture. Informal sources of finance account for the majority of borrowing for farmers in Africa as a whole. In terms of financial inclusion for agriculture, Ethiopia is more similar to the average SSA country, and Uganda is an outlier in the region, thanks to its high penetration of mobile financial services.

7.2.6 Agriculture Finance in Ethiopia

Ethiopia plays an important role in sub-Saharan Africa, in terms of both population and economy. This is a country of 1.14 million square kilometers and home of 118 million people (2021), 22% of whom live in urban areas. Ethiopia's per capita GDP was $944 in 2021, and the poverty rate was 24% in 2016 (the year of the most recent survey on household living standards). Agriculture dominates the Ethiopian economy, accounting for 33% of the country's GDP in 2021 and 67% of its employment in 2019. Financial institutions play only a small role in agricultural finance in Ethiopia for a variety of reasons, one of which is the substantial seasonality of agriculture determining the liquidity constraints of both farmers and lending agencies.

Policymakers often design policies aimed at promoting rural access to credit and other financial services in order to diversify the rural economy, increase private investment in smallholder agriculture, and encourage the use of modern seeds, mechanization, and irrigation. In Ethiopia, where agriculture dominates employment and overall national income, agriculture-led growth can boost overall economic growth (World Bank 2007). However, it remains unclear whether a financial inclusion strategy for rural areas truly can help increase rural productivity and income.

Ali and Deininger (2012) observe that expanding financial access in rural areas can support agriculture-led growth in Ethiopia under certain conditions. They find that farmers are supply-constrained due to a number of factors, including a lack of available credit, and that the credit constraint affects farmers' input use and hence farm productivity. However, they also observe that credit constraints matter more in fertile agricultural areas than in drought-prone areas and that reducing credit rationing can raise farm productivity on average by as much as 11%.

Their findings therefore tend to support the Ethiopian government's financial inclusion policy. However, there are certain features of agriculture, such as seasonality, that affect the performance of financial institutions as well as policies of the government and decision-making process of farmers.

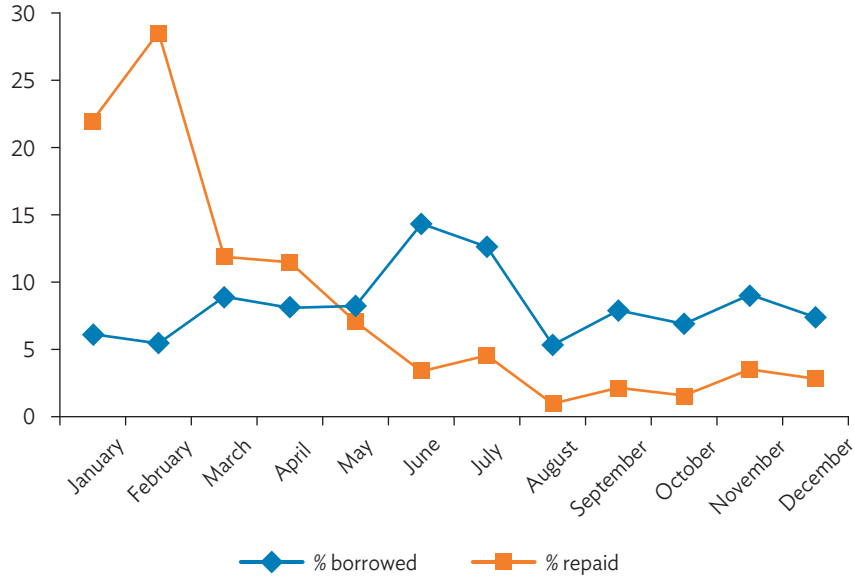
7.2.7 Seasonality of Agriculture

Ethiopian agriculture, like agriculture in most of the countries in SSA, is characterized by seasonality with crops that are season-specific, and the demand for labor and other inputs such as fertilizer, pesticides, and irrigation water hence vary by season and crop. As such, one expects that the demand for credit in support of agriculture would respond to this seasonality. This is the classic cash flow problem in farming. To examine whether credit demand and supply do in fact respond to crop seasonality, we examine the Ethiopian Rural Socioeconomic Survey data, which provide the timing of borrowing and loan repayment. As per the crop calendar, Ethiopia has four agricultural seasons: the winter (locally known as *bega*) lasting from December to February, autumn (*belg*) from March to May, summer (*kiremt* or *meher*) from June to August, and the harvest season (called *tseday*) from September to November (Munro-Hay 2002).

Figure 7.3 shows the distribution of loans by the month of borrowing and repayment. People repay loans more than they borrow during the first part of the year, particularly from January to April; the gap between repayment and borrowing is widest (23 percentage points) in February. Thus, borrowing goes up for consumption or planting in summer and lasts until the end of harvesting season. After harvest, farmers have enough cash to repay the loan in winter; however, by May, credit demand overstretches liquidity. More borrowing and less repayment take place between May to December, which in turn lowers their repayment rate, which is 3.5% in June.

The seasonal borrowing pattern reflects the seasonality of agriculture. As seasonality plays an important role in rural lending, financial institutions must consider this covariate risk in their financial intermediation strategy. They must help resolve farmers' cash flow problems stemming from the seasonality of crop production and other activities linked with agriculture, such as agro-processing and rural nonfarm activities.

Figure 7.3: Seasonality in Borrowing and Repayment



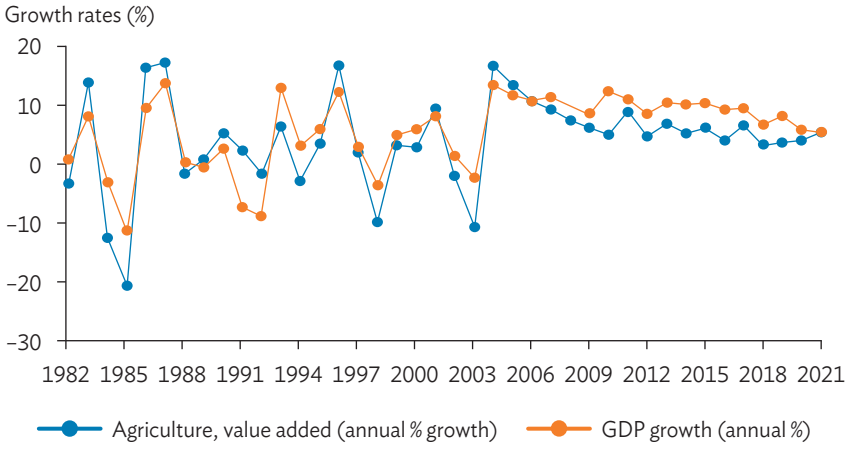
Source: World Bank (2014a).

7.2.8 Policy Setting

Although agriculture plays a big role in Ethiopian economy, it has not received as much attention as it should have. Policies and programs designed and implemented by the government matter greatly. Agriculture has been playing a dominant role in Ethiopia over the years, with the agricultural growth pattern overwhelmingly determining the country's overall GDP growth (Figure 7.4).

Figure 7.4 clearly shows how closely the cycle of real overall GDP growth over time follows the pattern of agricultural GDP growth. For example, in 1987, 1996, and 2004, agricultural GDP growth reached about 15%, which pulled up real GDP growth from a negative rate to around 13%. Thus, the stability of agricultural growth remains a key factor for Ethiopia's overall economy, and it is a factor that is strongly affected by annual variation in rainfall.

Figure 7.4: Gross Domestic Product Growth and Growth of Agricultural Gross Domestic Product over Time in Ethiopia



Source: World Bank (various years-b, c).

In recent years, growth in the manufacturing and service sectors has also helped keep Ethiopia's GDP growth rate at more than 10%, despite a slowdown in agricultural growth. In 2004–2005, agriculture accounted for 52% of the Ethiopian economy, followed by services (38%) and manufacturing (10%). About a decade later, in 2015–2016, the corresponding shares were 36%, 47%, and 17%, respectively. To reach middle-income status, Ethiopia needs substantial continued economic diversification, specifically growth in the agro-processing sector. This means agriculture cannot remain at the subsistence level if it has to play an important role in overall higher growth. Investment in the agriculture and agro-processing sectors deserves much more attention.

Financial institutions can help further economic diversification. These institutions can facilitate growth in agro-processing and agriculture-related industries to boost export earnings, which in turn can enhance growth in manufacturing and similar modern sectors. The Government of Ethiopia's agricultural policy has attempted to raise productivity through encouraging a shift to crop production for high-value export. This policy does not include a specific focus on agricultural finance; rather, the government finances agricultural policies through the state-owned Ethiopian Agricultural Transformation Agency.

The Ethiopian government's programs for financing agriculture include (i) subsidies for agricultural inputs, such as fertilizer, and for interest rates on agricultural lending; (ii) direct lending from government-owned financial institutions such as the Development Bank of Ethiopia (DBE) to promote private investment in agriculture; and (iii) credit guarantee and insurance to help mitigate agricultural risks. The government-supported, credit-based input subsidy program is run by the Agricultural Transformation Agency to promote subsidized loans for investment in agriculture through the DBE. However, this program acts as a disincentive for private banks to be engaged in the agricultural sector because the DBE provides low-cost loans. Similarly, although there are no interest caps on lending, the government highly regulates the financial sector; this affects private banks' lending in two ways: (i) Private banks are required to invest an amount equivalent to 27% of each new loan disbursed in treasury bills and (ii) The minimum deposit rate is viewed as an implicit tax on lending.

The government's credit risk guarantee facility acts as an enabling mechanism for financial institutions to provide credit to agricultural producers and value-chain actors involved in the production, transportation, processing, and marketing of export crops. But this policy does not help smallholders engaged in rainfed agriculture to guard against extreme weather variability; specifically, it does not include weather-indexed crop insurance products, which have been introduced successfully in a number of countries (e.g., World Bank 2011).

Farmers' constraints to financial access are partly due to limited financial services provided by the banks, cooperatives, and MFIs in rural areas. For example, in 2020/2021, there were 82 development banks in Ethiopia; these banks primarily served the urban population. There were 7.2 branches of commercial banks in Ethiopia per 100,000 people (Table 7.5). Thirty-nine MFIs and some 7,160 cooperatives (known as SACCOs) worked in rural areas in Ethiopia.

These coverage rates do not necessarily mean that all households have equal access to financial services. In recent years, financial inclusion has grown somewhat, but banks' involvement in agricultural lending has not reached more than 5%. As Figure 7.5 shows, the two largest sectors receiving commercial bank credit are mining, power, and water resources (22% of overall lending) and trade (21% of overall lending).

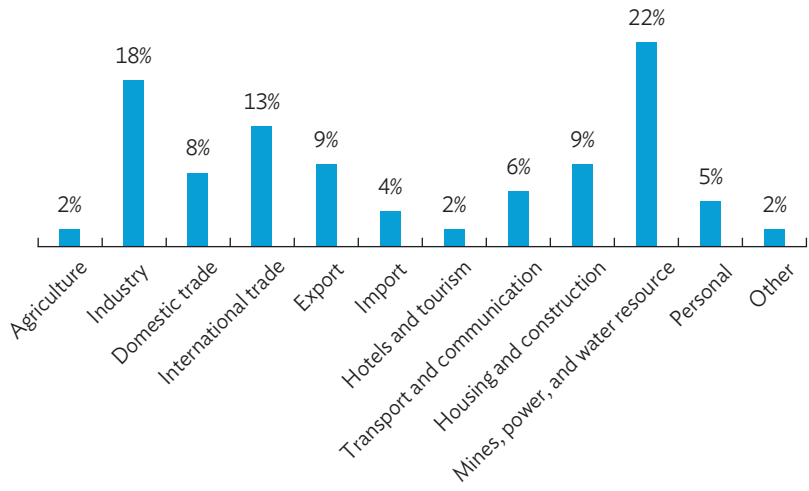
Table 7.5: Selected Financial Indicators of Ethiopia

Indicators	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
GDP ($ billion, current market price)	81.8	84.4	96.1	107.6	111.3
Nominal GDP per capita ($)	876	883	985	1,080	1,092
Share of agriculture in GDP (%)	36.3	34.9	33.3	32.7	32.5
Bank branches per 100,000 people	4.5	4.9	5.6	6.4	7.2
Number of development banks	110	110	107	93	82
Number of MFIs	35	35	38	39	39

GDP = gross domestic product, MFI = microfinance institution.

Source: National Bank of Ethiopia (2020/2021).

Figure 7.5: Distribution of Sectors for Commercial Bank Credit, 2021



Source: National Bank of Ethiopia (2021).

Table 7.6 shows the extent of institutional support for agriculture. As per the National Bank of Ethiopia, agriculture received only 12.0% of total institutional disbursement in 2016/2017 and 9.3% in 2020/2021. Thus, agriculture in Ethiopia is largely self-financed: institutional lending explains only 2% of agricultural GDP, while agriculture accounts for more than 30% of GDP.

Table 7.6: Lending in Agriculture in Ethiopia

Indicators	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Disbursement in agriculture (billion birr)	13.1	11.4	18.0	24.9	30.8
Outstanding loans in agriculture (billion birr)	20.0	19.5	20.4	21.1	31.8
Disbursement in agriculture as % of total disbursement	12.0	9.9	7.6	9.2	9.3
Outstanding in agriculture as % of total outstanding	5.5	4.3	2.4	2.0	2.5
Disbursement in agriculture as % of agricultural GDP	2.1	1.8	2.7	2.3	2.2
Outstanding in agriculture as % of agricultural GDP	3.2	3.0	3.1	1.9	2.3

GDP = gross domestic product.

Source: National Bank of Ethiopia (2016/2017–2020/2021).

7.3 Farmers' Access to Finance: Household-Level Survey Data Analysis

Farmers' access to finance from alternative sources from recent surveys is shown in Table 7.7. The most recent household survey data explains the rural vis-à-vis urban access to alternative sources of finance. The overall access to finance was only 25.6% for rural areas against 85.7% in urban areas. When access is differentiated by digital and non-digital methods, non-digital (banks, MFIs, and cooperatives) accounted for the major share. The percentage of non-digital access to finance was 34.7% overall with 85.7% in urban and 25.6% in rural areas. In contrast, digital methods (ATM, online banking, and mobile banking) accounted for 12.0% overall with 52.9% in urban areas and 4.7% in rural areas. No wonder the overall access rate is only 25.6% in rural Ethiopia, of which mobile banking accounts for 1.5%.

Of course, access means more than borrowing; those who have an account with any financial services do not necessarily borrow from these sources. Table 7.8 shows the percentage of borrowers in urban and rural areas.

Table 7.7: Access to Finance by Farmers (%) in Ethiopia from Household Survey Data

Indicators	Urban	Rural	Overall
Non-digital access	85.7	25.6	34.7
Commercial banks	83.8	18.6	28.5
Microfinance	7.2	5.1	5.4
SACCOs (cooperatives)	11.2	6.3	7.1
Digital access	52.9	4.7	12.0
ATM/Debit cards	52.0	3.6	11.0
Online banking	11.8	1.4	3.0
Mobile banking	25.4	1.5	5.2
Overall access	85.7	25.6	34.7
N	1,358	2,543	3,901

SACCO = savings and credit cooperative.

Note: Since all households that have digital access have non-digital access too, the share of non-digital access is the same as that of overall access.

Source: Ethiopia Socioeconomic Survey – Wave 4, 2018/2019 (Central Statistical Agency of Ethiopia n.d.).

Table 7.8: Borrowing by Farmers (%) in Ethiopia from Household Survey Data

Sources	Urban	Rural	Overall
Any formal source	4.6	5.5	5.4
Commercial banks	0.5	0.04	0.1
Microfinance	1.2	2.2	2.1
SACCOs (cooperatives)	2.0	2.8	2.7
Other NGOs	0.8	0.1	0.2
Online sources	0.1	0.3	0.3
N	1,358	2,543	3,901

NGO = nongovernment organization, SACCO = savings and credit cooperative.

Note: Borrowing during last 12 months is considered.

Source: Ethiopian Socioeconomic Survey – Wave 4, 2018/2019 (Central Statistical Agency of Ethiopia n.d.).

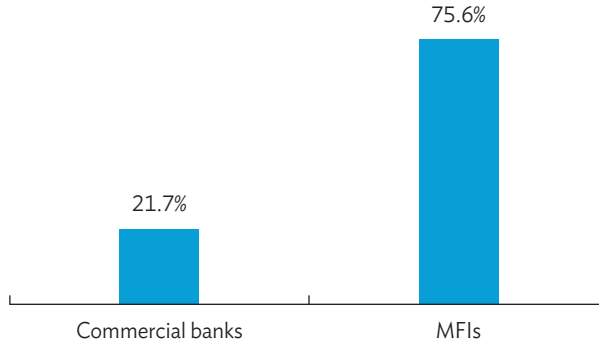
We find that only 5.5% of farmers in rural areas borrowed overall in 2018/2019, and 2.2% borrowed from MFIs. Therefore, Ethiopia is unlike other countries in SSA such as Kenya and Uganda, as it has little coverage of financial services including that of mobile financial services, a fact that was also documented by the Global Findex data.

7.3.1 Policy Options to Enhance Access

One way to enhance farmers' financial access would be to expand the coverage of commercial bank branches. However, as in many other countries, commercial banks in Ethiopia are reluctant to extend credit to farmers and are more interested in mobilizing savings because of the high transaction costs inherent in agriculture (specifically, the high loan default costs and the seasonality of farming).

A lack of liquidity also poses a challenge for MFIs and cooperatives in extending credit to agriculture, compared to commercial banks. As Figure 7.6 shows, in 2021, MFIs in Ethiopia mobilized a substantial amount of savings—over 75% of their outstanding loans. In contrast, commercial banks' share of mobilized savings is only about 22% of their outstanding loans. Many of the loans extended by commercial banks go to support manufacturing, trade, and services.

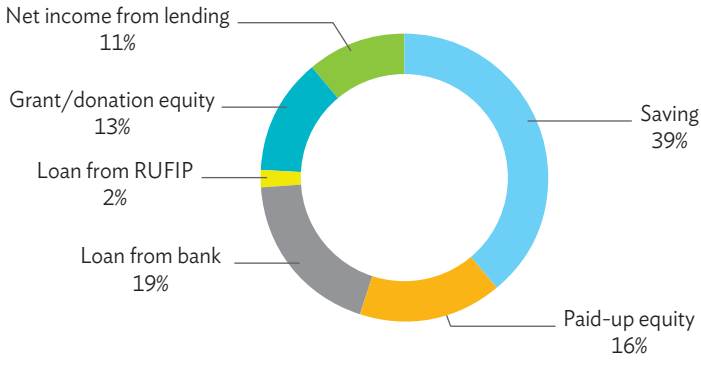
Figure 7.6: Savings as Percentage of Loans Outstanding by Institutions in Ethiopia, 2021



MFI = microfinance institution.
Source: National Bank of Ethiopia (2021).

Thus, liquidity remains a challenge for rural SACCOs and MFIs in terms of providing credit to agriculture. Cooperatives and MFIs could increase deposits in order to raise loanable funds; however, these institutions cannot mobilize savings from members or nonmembers the way that commercial banks can. Another solution could be to use banks' surplus deposits for lending to rural sectors. In fact, as Figure 7.7 illustrates, loans from banks and other sources constitute a major source (19%) of MFI on-lending in Ethiopia, followed by paid-up equity (16%), donor funds (13%), and net income from lending (11%).

Figure 7.7: Sources of Microfinance Institution Funds in Ethiopia, 2008



RUFIP = Rural Financial Intermediation Programme.

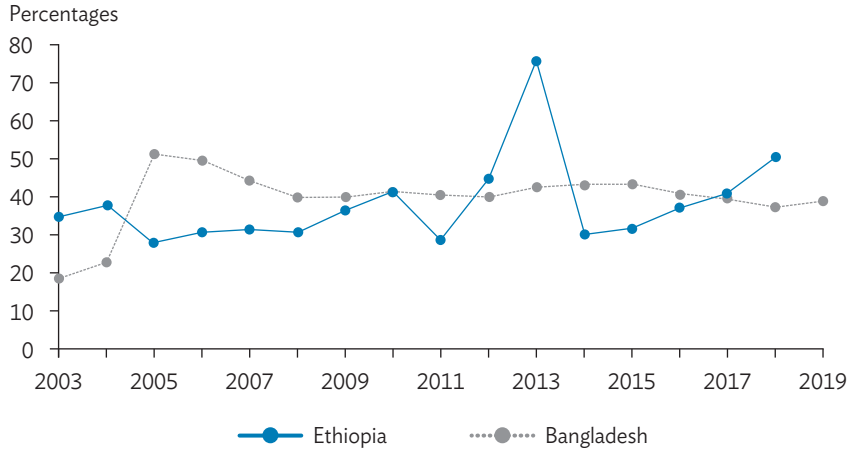
Source: Reported by Wiedmaier-Pfister et al. (2008) from unpublished report of Amha (2007).

The Government of Ethiopia recently introduced a scheme to enhance cooperatives' loan portfolios using bank loans provided by the government. Although cooperatives are efficient in lending and in reaching smallholders, they are not efficient at recovering such loans, meaning that commercial banks cannot easily recover funds lent to cooperatives. Thus, supporting cooperatives through banks' loans or government money may not be an effective way to improve agricultural financial inclusion due to the incentive structures of cooperatives themselves.[6]

[6] The incentive structure is such that the cooperatives are not accountable to recover loans out of government-provided funds like banks' management of their own money to lend.

MFIs may be a better channel through which to increase financial inclusion in rural Ethiopia and to benefit smallholders and other rural producers.[7] The share of these institutions is higher than cooperatives, and they provide better incentives to recover loans, making them more sustainable. The practices of MFIs in Ethiopia are very consistent with the practices of an average MFI in Bangladesh, although the savings mobilization rate in Bangladesh has been higher than that in Ethiopia for the last few years (see Figure 7.8). Grameen Bank, the largest and most famous MFI in Bangladesh, mobilizes more savings than it lends out.

Figure 7.8: Deposit as Percentage of Loans Outstanding in Microfinance Institutions



Source: World Bank (2020a).

A possible way to enhance MFIs' portfolios is to extend bank loans to MFIs for on-lending without any government involvement. Similarly, MFIs could be encouraged to mobilize savings from nonmembers by registering these institutions as specialized banks. Such schemes are one of the ways in which some countries are expanding MFI services to serve smallholders in rural areas where commercial banks are reluctant to lend.

[7] MFIs could also promote social inclusion by extending financial services to women and other disadvantaged groups within rural societies.

7.3.2 Agricultural Finance in Uganda

Similar to the rest of sub-Saharan Africa, more than two-thirds of Uganda's labor force is employed in agriculture, and the agricultural sector is broadly dominated by smallholder farmers. But there are substantial differences in terms of access to institutional and mobile finance between Ethiopia and Uganda. More importantly, about half of the households in Uganda's urban areas have, besides pursuing nonfarm activities, also taken up some form of farming in recent years due to concerns about food security (see, for example, Mukwaya et al. 2012). Addressing ways to improve farmers' resilience to weather- and disease-related shocks, including modernizing agricultural techniques, has also been a central focus in the country's agricultural policy (Bank of Uganda 2013). Although direct finance to agricultural households, particularly poorer households, is growing, its reach remains limited, particularly with the effects of the coronavirus disease (COVID-19) pandemic and amid the unpredictable harvests and surpluses that have resulted from increased climate variability.

Looking across different channels of finance (formal, semi-formal, informal, and mobile), we find that semi-formal microcredit institutions that offer financial services coupled with technical assistance (extension services, for example) appear to have the highest potential to improve agricultural productivity among Uganda's smallholder farmers. Lending in rural areas, while carrying increased risks because of greater poverty and greater climate and weather variability, does seem to have been profitable for major semi-formal microcredit institutions, particularly those that offer additional services (such as training and technical assistance) to clients; these services may improve clients' performance and thus their ability to repay loans. Supporting the expansion of financial services into a broader range of areas can also help support smaller borrowers heavily hit by the COVID-19 crisis.

7.3.3 Policy Setting

Uganda's financial sector is divided into four tiers (Table 7.9). As of 2019, formal sources monitored by the Bank of Uganda included 26 commercial banks (Tier 1), 3 licensed credit institutions (CIs) (Tier 2), and 6 micro-deposit-taking institutions (MDIs) (Tier 3) (Economic Policy Research Centre 2020). The reach of these institutions is not wide. Overall, less than 20% of rural Ugandans use financial services from Tier 1, 2, and 3 institutions, and the focus of formal lending to agriculture has been in commercial activities (Economic Policy Research Centre 2021).

Table 7.9: Uganda's Financial Sector Presented in Tiers

Tier	Type of Institution	Applicable Law	Regulator	Some Key Institutions (across Urban and Rural Areas)	Share of Total Agricultural Lending (as of 2020)
1	Commercial banks	Financial Institutions Act, 2004	Bank of Uganda	Centenary Bank, Equity Bank	80.6%
2	Credit institutions	Financial Institutions Act, 2004	Bank of Uganda	PostBank Uganda, Opportunity Bank	6.3%
3	MDIs	MDI Act, 2003	Bank of Uganda	FINCA, Pride Microfinance, UGAFODE	3.9%
4	Other MFIs and SACCOs	Companies Act, NGO Act, Cooperative Societies Act, Money Lenders Act	None	**MFIs:** includes VisionFund, BRAC Uganda **SACCOs:** includes Wazalendo, Y-Save	2.6% 6.6%

MDI = micro-deposit-taking institution, MFI = microfinance institution, NGO = nongovernment organization, SACCO = savings and credit cooperative.

Source: Association of Microfinance Institutions in Uganda (AMFIU). 2015. Uganda Microfinance Directory.

Overall, about 80% of formal and semi-formal loans to agriculture come from commercial banks (Tier 1 institutions). Box 7.1 shows Uganda's history of lending to agriculture through government-sponsored channels. In stark comparison, over 2,000 semi-formal institutions exist in Tier 4, covering MFIs as well as savings and credit and cooperatives (SACCOs) that constitute semi-formal, community, membership-based financial institutions, formed and owned by their members to promote the community's own economic interests; SACCOs have also helped rural households have more access to finance in areas where other financial institutions are scarce.

Institutions in Tier 4 have expanded rapidly. These institutions served about 120,000 clients in the early 1990s and grew to over 1 million clients by early 2000 (AMFIU 2015). Tier 4 MFIs, which have typically not been supervised or regulated by a central authority, have also achieved significantly higher growth rates than their regulated MDI counterparts, which also compete with commercial banks.

In 2016, however, Uganda's Microfinance Institutions and Money Lenders Act established the Microfinance Regulatory Authority to license and manage all Tier 4 microfinance institutions including SACCOs and non-deposit-taking microfinance institutions such as BRAC; the Act expanded the authority's reach to informal sources as well, including money lenders, self-help groups (sometimes known as village and savings loan associations), and commodity-based microfinance institutions.

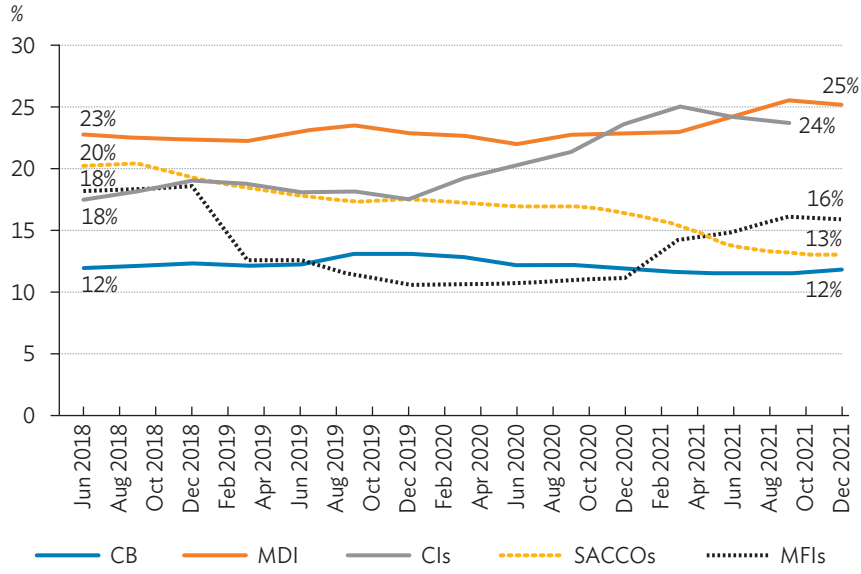
Box 7.1: Government Efforts to Engage Formal Finance in Agriculture

- **1980s:** The Uganda Commercial Bank (UCB) and the Cooperative Bank, both public sector banks, started in the 1960s to provide agricultural loans to farmers at government-subsidized interest rates. Some of these lending schemes were financed by the central bank. In practice, these banks would not lend actively because the government-subsidized funds were perceived to undermine loans from their own sources (Suruma 2014). By the early 1990s, both UCB and the Cooperative Bank were rendered bankrupt due to nonperforming loans and poor supervision; UCB was merged with a South African bank in 2001, while the Cooperative Bank was closed in 1999.
- **2000s:** In response to difficulties with UCB and Cooperative Bank, the Bank of Uganda began lending through its own Development Finance Department. Some programs included the Linkage Banking Program under the African Rural and Agricultural Credit Association, the Capacity Building Program for microfinance institutions under the Cotton Subsector Development Project, the Capacity Building for Rural Women Financial Intermediaries Program, financed by a grant from the International Fund for Agricultural Development, and the Danish International Development Agency–funded Rural Financial Services Component, which aimed at widening financial service outreach to rural areas. In 2006–2007, the Development Finance Department and all its activities were transferred to the Uganda Development Bank Limited. Although these schemes yielded some individual successes, they have not transformed agriculture in the country, and productivity has remained flat over time.
- **2020:** In April, in response to the COVID-19 pandemic, the Bank of Uganda provided credit relief (in terms of relaxing repayment conditions) to borrowers from formal (Tier 1, 2, and 3) institutions, namely commercial banks, credit institutions, and micro-deposit-taking institutions.

7.4 Trends in Agricultural Lending

Figure 7.9 provides some insight into agricultural lending before and after the onset of the COVID-19 pandemic, across formal and semi-formal institutions. Over the period, the share of lending to agriculture remained fairly consistent across sources, except that the share of portfolios in agriculture rose from 18% to 24% among credit institutions and fell from 20% to 13% among SACCOs.

Figure 7.9: Share of Loan Portfolios in Agriculture, 2018–2021: Commercial Banks, Micro-Deposit-Taking Institutions, and Credit Institutions



CB = commercial bank, CI = credit institution, MDI = micro-deposit-taking institution, MFI = microfinance institution, SACCO = savings and credit cooperative.

Source: Bank of Uganda statistics.

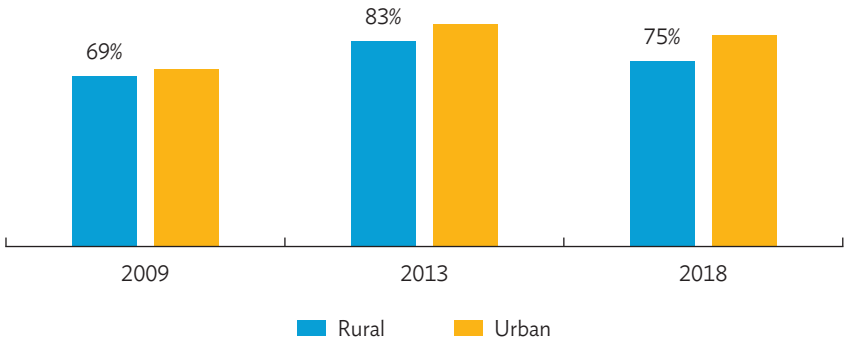
Contributing factors include greater relaxation on repayment for formal loans, imposed by the Bank of Uganda in April 2020 (Box 7.1), as well as the closure of many SACCOs due to the staggering increase in loan defaults (CGAP 2020). Even prior to the COVID-19 pandemic, SACCOs have tended to face several operational challenges, including a less-secure set of borrowers with greater default rates, corruption and other internal management issues, and low business volumes (Economic Policy Research Centre 2021).

A clear difference also appears across formal sources in terms of agricultural activities financed. According to statistics from the Bank of Uganda, about 35% of commercial banks' agricultural portfolios in 2021 went toward production activities (across crops and livestock), while 65% went toward processing and marketing. These shares flip for MDIs and CIs, however.

About 70% of MDI lending in agriculture went toward production and 30% went toward marketing activities. For CIs, these shares were 60% and 40%, respectively. Loan clients for commercial banks were more likely to be engaged in larger scale marketing of surplus, while clients for semi-formal lending focused more on production activities.

This trend extends more broadly to rural areas and financial services. According to the Global Findex database, 66% of the rural population had an account in 2021, but only half of them (33%) had an account at a formal financial institution. Of respondents in rural areas, 77% borrowed, of which only about one-quarter borrowed from a formal financial institution. The lack of institutional finance has detrimental effects on agriculture; small farmers often incur heavy debts from moneylenders, for example, and have to presell their harvest at low prices to get cash up front, thus diminishing their revenues. The Uganda FinScope Survey of multiple years (FSD Uganda 2018) also reveals that growth in access to financial services (whether formal or informal) has shrunk over time in the years preceding the COVID-19 pandemic, with a greater shortfall in rural areas (Figure 7.10). Given the social, health, and economic shocks stemming from the onset of the pandemic in 2020, these issues have worsened.[8]

Figure 7.10: Share of Population Accessing Financial Services, Uganda FinScope Survey, 2009, 2013, 2018



Sources: FSD Uganda (2018) and Economic Policy Research Centre (2020).

[8] Nevertheless, Uganda's rural population (who are mostly farmers) have a financial access rate of as high as 75% compared to only 26% in Ethiopia.

7.4.1 Government Policies Pursued to Improve Farmers' Access through Microfinance and Cooperatives

Although formal and semi-formal lending to agriculture in Uganda has been concentrated in commercial farming expansion, the country has pushed over the last decade to improve access to microfinance institutions and cooperatives so that low-income households have more options to save and borrow (Box 7.2).

Box 7.2: Pre-Pandemic Policy Efforts by the Uganda Government to Improve and Sustain Microfinance

- In 2009, the government established the Agricultural Credit Facility (ACF) in partnership with participating financial institutions (including commercial banks, the Uganda Development Bank Limited, and micro-deposit-taking institutions). The main objective of the ACF is to promote the commercialization of agriculture through the provision of medium- and long-term loans focusing on "value addition" (for example, agro-processing machinery and equipment, storage facilities, and agricultural inputs like pesticides and fertilizers) at subsidized interest rates. The maximum loan period is eight years and the minimum six months, with interest rates between 10% and 12%. Limited communication about the availability of funds for the agricultural sector, however, has hampered further expansion effort, as have inadequate contributions by the government and participating financial institutions to the scheme and the mismanagement of funds (CSBAG 2014). In addition, the ACF has not met the needs of smallholders, who lack the collateral to be considered for the program; in 2016, 42% of borrowers of the ACF were small and medium-sized enterprises, while the remainder of funds was lent to projects in agro-processing.

- In 2001, the government set up a Microfinance Support Centre offering loans to farmers at subsidized interest rates of around 9% (as well as commercial credit at 13%).

- In late 2014, the Project for Financial Inclusion in Rural Areas (PROFIRA) was introduced, implemented by the Ministry of Finance, Planning and Economic Development over seven years with financing from the International Fund for Agriculture Development. The aim of the project is to sustainably increase access to and use of financial services by rural poor people. A main push has been to strengthen capacity-building for SACCOs and to establish new community-based savings and credit groups, as well as greater monitoring of semi-formal sources of finance.

- Following PROFIRA, in May 2016, the Tier IV Microfinance Institutions Act was passed by the Ugandan Parliament. A key provision of the Act is the establishment of the Uganda Microfinance Regulatory Authority, which has the mandate to license, regulate, and supervise savings and credit cooperatives, village saving and loan associations, non-deposit-taking microfinance institutions, and moneylenders to enhance financial inclusion, financial stability, and financial consumer protection for low-income individuals.

Prior to the COVID-19 pandemic, Tier 4 institutions were rapidly increasing their services and financing for rural households. Financial services among these institutions include deposits, loans, payment services, money transfers, and insurance for low-income households. Many Tier 4 microfinance institutions also supply additional services, including technical agricultural assistance, business skills development, leadership training for women, education services including financial literacy, and health and basic medical services. The 2018 Uganda FinScope survey showed that among smaller farmers borrowing for agricultural purposes, demand for better inputs was high—54% reported borrowing to purchase agricultural inputs, compared to 29% who reported borrowing to hire farm labor, 15% to buy livestock, 8% to purchase agricultural land, and 6% to purchase farm equipment (FSD Uganda 2018). Services for modernizing agriculture therefore appear to be in demand.

Many agricultural households have also engaged with microfinance institutions for other services outside financing. For example, BRAC, one of the world's largest nongovernment institutions, currently has 125 branch offices throughout Uganda and reaches over 800,000 poor female farmers. The organization's existing agriculture and livestock extension program aims to improve productivity by training women in modern agricultural practices: line sowing, weeding, intercropping, and crop rotation; crop and poultry disease prevention; adoption of improved seeds and chicken breeds; introduction of new crops; and use of poultry vaccines. The program disseminates information about these new technologies and practices through local community members (exclusively women) called model farmers and community promoters. BRAC chooses these women for a six-day training based on their business skills, agricultural and livestock knowledge, and popularity in their villages. The women then take charge of training other farmers and selling seeds and vaccines.

In rural areas, therefore, there has been a push in recent years to assist farmers through different types of loans and through increasingly regulated semi-formal institutions. The expansion of semi-formal credit has not been without problems, however, including claims of inequitable distribution of loans due to limited regulation and supervision, political interference in loan activity (The Economist 2017), and increases in MFI and SACCO lending rates to match those charged by commercial banks. The COVID-19 pandemic, as mentioned above, also heavily hit borrowers' ability to repay and in turn had

more severe consequences for Tier 4 institutions, whose client base (whether smaller farmers or enterprises) was more vulnerable to shocks from the crisis. Supporting a broader range of financial services, including opportunities to save, among Tier 4 institutions is critical to supporting financial resilience among lower-income rural households, particularly in the wake of declining credit demand and financial engagement stemming from the crisis. Extension services in addition to financial services have also proven to be extremely important and in high demand; similarly, improved rural infrastructure, including feeder roads, piped water/irrigation, and electricity, is needed to support expansions in agriculture along with financial services.

7.4.2 Digitalization of Financial Services

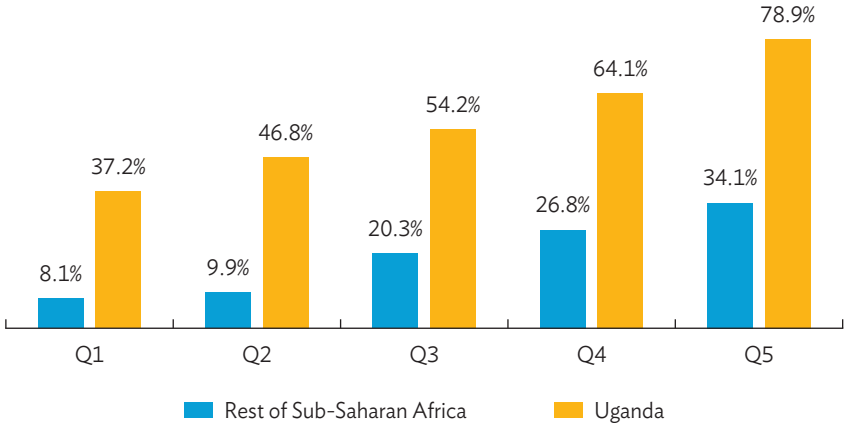
Within agriculture, moving to digitalized platforms is important for a range of different activities closely tied with agricultural productivity—including keeping track of inventories; monitoring costs and availability of inputs; assessing market prices and demand; coordinating transport, storage, and marketing; and easing financial transactions.

Alternative channels of finance, including mobile money services, have aided significantly in reaching areas with limited or no banking presence. Mobile money services began to take off in Uganda in 2009, increasing from about 10,000 account holders in the first year to 14.2 million in 2013 and reaching 22 million by mid-2018 (Okeleke 2019). Currently, about 50% of Uganda's adult population in rural areas have a mobile money account, and about 58% have made or received digital payments (Demirguc-Kunt 2022). To underscore the growth of mobile banking in Uganda, Figure 7.11 uses data from the Global Findex survey to show that individuals working in agriculture in Uganda in all wealth quintiles were much more likely to own a mobile banking account in 2014 than the average individual in all wealth quintiles in the rest of sub-Saharan Africa.

Recent studies have linked mobile money adoption with increased farm income, including increased use of fertilizer as well as adoption of high-yielding maize seeds (Tabetando, Matsumoto, and Fani [2022], who use data from about 780 households collected between 2003 and 2015). Mobile services in agriculture have been mostly focused on providing information on markets, weather, and procurement (FAO 2020); this includes apps such as AgriFin Mobile

and Farm Kiosk that are making headway in connecting farmers with markets and extension services, as well as increasing financial and digital literacy.[9] There is still much scope for connection with financial institutions, however. In general, greater linkages with formal bank accounts and other services can help augment the benefits of mobile money (Dupas et al. 2018; Wieser et al. 2019).

Figure 7.11: Share of Individuals in Agriculture Who Have a Mobile Banking Account (Uganda Compared with the Rest of Sub-Saharan Africa, 2014)



Note: Later years of the Global Findex survey (2017 and 2021) do not have disaggregated questions on financial services that individuals in agriculture use.

Source: World Bank Global Financial Inclusion database (Demirguc-Kunt 2015).

7.4.3 Interrelationship Between Financial Inclusion and Farm-Level Income and Productivity

What evidence do we have to support the idea that enhanced access to credit and other services can raise farm-level productivity and food security in Africa? To answer this question, we need to figure out how agricultural finance affects farm productivity and food security.

[9] See the website of Farm Kiosk (https://farmkioskafrica.com/) and MercyCorps' AgriFin work related to Uganda (https://www.mercycorpsagrifin.org/country/uganda/).

A household's resource allocation, either for farm or nonfarm production, depends on input and output prices, as well as on the production technology governing the production framework. Thus, given the objective of minimizing cost for a given level of output, the optimal level of inputs is determined by the input prices, including interest rates of credit used in production. In addition, given the cost curve of different production levels, a producer wants to maximize profits, which depends on the market prices of outputs; in such a case, output prices influence the level of production and input uses. Therefore, the use of inputs for optimal levels of production will depend on the budget available to support the production cost. If the budget necessary for optimal use of inputs is not enough for a producer's available sources, the producer is essentially liquidity- or budget-constrained in production. In such a situation, the producer can also be considered credit-constrained. In the case of a liquidity-constrained producer, the amount of borrowing or liquidity, in addition to the input and output prices and the production technology, influences farm and nonfarm production.

In a rural setting, where households are both producers and consumers of agricultural products, production and consumption decisions are interdependent; hence, the liquidity constraints encountered in production also affect a household's consumption decisions. However, without data regarding the extent of rural households' credit constraints, it may be difficult to test whether a rural household is liquidity- or credit-constrained (e.g., Carter 1988; Feder et al. 1990). We assume, however, that some rural households, given their production technology, are liquidity-constrained in both production and consumption.

In order to quantify the productive role of financial services like institutional credit, we examine more detailed household survey data that is available from the World Bank's microdata bank. Khandker and Samad (2018) analyzed the Ethiopia Rural Socioeconomic Survey of 2011–2012.[10] Results show that household borrowing from an institutional source (either an MFI or a cooperative) does not seem to have any significant effect on any component of farm income (self and wage). However, institutional borrowing increases nonfarm income by as much as 27.9%, own nonfarm (enterprise) income by 26.4%, and nonfarm wage and salaried income by 29.4%.

[10] This is the most recent household survey data available for such an analysis of the impact of financial access on farm income and productivity. Note that this survey is a general rural household survey including both farmers and nonfarmers. Data analysis presented here is primarily drawn from Khandker and Samad (2018).

Koolwal and Khandker (2018) also examined similar household survey data from Uganda to demonstrate how institutional credit affects household level of resilience. Resilience means the ability to cope with current and future shocks and stresses—natural hazards such as floods, droughts, earthquakes, and food chain threats caused by disease and sudden illness/death, conflicts and protracted crises. Agricultural households face a range of different natural and environmental shocks, which affect output and productivity as well as consumption. While a growing body of literature examines the effects of different sources of finance on agricultural practices, few studies have examined the indirect role of borrowing on resilience, or the ability to cope with shocks, particularly in areas where agricultural lending is still emergent. Such indirect channels can include additional services, such as agricultural extension programs, that financial institutions in rural areas can provide.

This study shows that the only observed effect of borrowing on coping with natural shocks comes from borrowing from semi-formal sources, which has a significant positive effect on whether a household changes its cropping practices or agricultural technology use. Borrowing from semi-formal sources such as MFIs or cooperatives includes additional assistance (such as extension services or education) other than credit that could help agricultural households better cope with shocks. Results also demonstrate that the effects of borrowing from semi-formal sources such as MFIs are statistically significant and positive for coping with natural shocks that affect households' livelihoods. Coping strategies that are significantly affected by semi-formal borrowing include changes to cropping practices/agricultural technology use; this underscores the importance of the additional support services (such as extension services) that are provided by some larger semi-formal microfinance institutions.

A more recent survey available from the World Bank (2020b) on Uganda is used in this chapter to characterize how financial institutions, mainly semi-formal institutions such as cooperatives and MFIs, have penetrated the rural markets to support farmers' borrowing needs and play an important role in raising farm income and productivity. The World Bank's microdata bank has recently made the Uganda National Panel survey of 2019/2020 available, and it has farm-level survey data of agricultural production as well as borrowing from various sources and its use in farming. A total of 3,078 households were covered in this survey of which 31.5% are urban households and 68.5% are rural households.

However, 43.1% of urban households draw income primarily from farming and, hence, are considered as farmers. On the other hand, some 90.8% of rural households primarily draw income from farming. As the distribution indicates, 75.7% of the total sample of 3,078 households can be considered as farmers.

Table 7.10 explains the data in terms of borrowing from alternative sources by rural and urban households. We see that the overall rate of borrowing from institutional sources was about 30% in 2019/2020 with nearly 33% in urban Uganda followed by 30% in rural Uganda. In rural Uganda, 3.1% of households borrowed from commercial banks compared to 7.0% in urban areas. Some 1% of rural households borrowed from MFIs compared to some 27% from cooperatives. It is also worth noting that although mobile financial services are widely available, they are still not utilized for lending by the financial institutions, so only 0.3% of households borrowed using mobile technology. The use of mobile financial accounts for receiving remittances was much more common; some 80.4% of urban farmers and 58.6% of rural farmers had used mobile money accounts for this purpose. Overall, 62.5% of farmers (who draw income primarily from farming) received remittances using mobile technology.

Table 7.10: Borrowing by Farmers (%) in Uganda from Household Survey Data

Sources	Urban	Rural	Overall
Borrowed from any source	32.6	30.0	30.4
Borrowed from commercial banks	7.0	3.1	3.8
Borrowed from microfinance	1.6	0.7	0.8
Borrowed from cooperatives[a]	24.3	27.2	26.7
Borrowed using mobile money account	0.6	0.2	0.3
Remittances received through mobile money account	80.4	58.6	62.5
N	371	2,172	2,543

Note: Borrowing from formal and semi-formal sources during last 12 months are considered.

[a] Cooperatives include savings clubs, rotating savings and credit associations (ROSCAs), welfare funds, savings and credit cooperatives (SACCOs), investment clubs, burial societies, accumulating savings and credit associations (ACSAs), and village savings and loan associations (VSLAs).

Source: Uganda National Panel Survey, 2019/2020 (World Bank 2021).

Table 7.11 provides a description of the purpose of borrowing; among 783 households who borrowed from any source, some 60% borrowed for consumption smoothing. Some 17% borrowed for purchasing nonfarm inputs, 15% borrowed for farm inputs, and 12% for land/house material purchases. This is similar for the households that borrowed from cooperatives (702 households, accounting for almost 90% of all borrowing households). Borrowing to support consumption is also the most common purpose for households who borrowed from commercial banks and microfinance institutions.

Table 7.11: Purpose of Borrowing by Farmers (%) in Uganda from Household Survey Data

Sources	Land/House or Building Material Purchase	Livestock Purchase	Farm Input or Equipment Purchase	Nonfarm Inputs or Capital Purchase	Consumption Expenditure	N
Any source	12.0	1.7	15.0	16.9	60.3	783
Commercial banks	33.2	2.9	16.6	15.7	39.1	74
Microfinance	13.9	0	9.0	29.3	51.6	25
Cooperatives	10.5	1.8	15.0	16.5	62.4	702

Notes: Borrowing from formal and semi-formal sources during last 12 months are considered. Borrowing using mobile money accounts is not reported because of too few observations.

Source: Uganda National Panel Survey, 2019/2020.

Given the facts that more than 80% of Ugandan households draw income from farming, that a large percentage borrow for consumption purposes, and that a lower percentage borrow for productive purposes, it is important then to determine the role of institutional finance (commercial/MFI/cooperatives/mobile) on farm income and its various sources. Since this is cross-sectional survey data (the first year of a new panel survey initiated in 2019/2020), we have to deal with endogeneity of borrowing since both borrowing and income (from any source) are jointly determined by the same observed and unobserved factors. If we had an opportunity to have some instruments that affect only borrowing but not income, we could have used a quasi-experimental method such as the instrumental variable (IV) method to estimate the impact of borrowing on income. Unfortunately, we do not have such instruments available from the survey.

We have community-level information from the community surveys; however, that cannot be combined with the household survey so that we could use some of the community-level services such as distance to the nearest bank or MFI as instruments in the borrowing equation to predict the level of borrowing to be included in the income equation in the second stage. Unfortunately, the household survey cannot be tied with the community survey as there is no community identifier in the household section. The most we can do is to use a sub-county-level fixed effect (FE) method as an alternative estimation to the simple ordinary least squares (OLS) regression of income equations.

Table 7.12 shows two sets of regression results with two models: the first set is the simple OLS regressing income against borrowing (whether borrowing—1 for yes, 0 for no) and the second set is the county-level fixed effect method. Simple OLS does not control for any endogeneity associated with borrowing, while sub-county level fixed effect controls for at least some type of endogeneity even if it is not an ideal way of controlling for the endogeneity of borrowing or receiving remittances. So, we prefer the FE method over the OLS method. Also, we have two models—one model regresses income on whether households borrow from any source, and the second model regresses income on various sources of borrowing. In both models, remittances received is an additional regressor. Note that a host of household-level variables such as age, gender, and education of household head; landholding; and similar exogenous variables (in the short run) are used as additional control regressors.

According to the FE results for model 1, we find that borrowing from any source can increase crop income by 43%, poultry income by 20%, and total farm income by 51%. When borrowing is disaggregated by alternative sources (model 2), we find that borrowing from a commercial bank reduces livestock income without any significant impact on any other category of income.[11] Similarly, borrowing from microfinance does not have any significant impact on any source of income, although there seems to be a positive correlation between micro-borrowing and total farm income and crop income.

[11] The negative association between commercial bank borrowing and livestock income may suggest that sub-county-level FE has not been able to address the endogeneity of borrowing from commercial bank sources. Note also that only 2.9% of borrowers among those who borrowed from commercial banks actually used the funds for livestock investment. Hence, it is perhaps a spurious correlation.

Table 7.12: Impacts of Borrowing by Farmers on Farm Income in Uganda (N = 2,543)

	Log Crop Income		Log Livestock Income	
OLS estimates				
Sources	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Household borrowed from any source	0.724** (3.49)	–	0.212 (1.55)	–
Household borrowed from commercial banks	–	0.147 (0.25)	–	−0.511** (−4.11)
Household borrowed from microfinance	–	−0.072 (−0.19)	–	−0.341** (−3.01)
Household borrowed from cooperatives	–	0.816** (3.70)	–	0.309** (2.08)
Household receives money through mobile money account	0.112 (0.66)	0.118 (0.70)	0.070 (0.54)	0.086 (0.67)
F-statistics	F(18, 2524) = 5.35	F(20, 2522) = 5.03	F(18, 2524) = 4.43	F(20, 2522) = 3.28
P>F	0.000	0.000	0.000	0.000
Sub-county level FE				
	Model 1	**Model 2**	**Model 1**	**Model 2**
Household borrowed from any source	0.427** (2.12)	–	0.149 (1.06)	–
Household borrowed from commercial banks	–	−0.139 (−0.28)	–	−0.414** (−2.16)
Household borrowed from microfinance	–	0.445 (0.94)	–	−0.164 (−1.00)
Household borrowed from cooperatives	–	0.445* (1.99)	–	0.215 (1.38)
Household receives money through mobile money account	0.106 (0.56)	0.124 (0.67)	0.211 (1.31)	0.227 (1.42)
F-statistics	F(18, 471) = 4.21	F(20, 471) = 4.53	F(18, 471) = 2.12	F(20, 471) = 2.03
P>F	0.000	0.000	0.005	0.006

continued on next page

Table 7.12: ***Continued***

Sources	Log Poultry Income		Log Total Farm Income	
	OLS estimates			
	Model 1	Model 2	Model 1	Model 2
Household borrowed from any source	0.164** (2.08)	–	0.805** (3.65)	–
Household borrowed from commercial banks	–	0.021 (0.10)	–	0.074 (0.12)
Household borrowed from microfinance	–	−0.133 (−1.33)	–	−0.147 (−0.38)
Household borrowed from cooperatives	–	0.164** (2.05)	–	0.915** (3.86)
Household receives money through mobile money account	0.070 (0.98)	0.075 (1.04)	0.048 (0.16)	0.057 (0.31)
F-statistics	F(18, 2524) = 2.80	F(20, 2522) = 2.55	F(18, 2524) = 6.05	F(20, 2522) = 5.84
P>F	0.000	0.000	0.000	0.000
	Sub-county level FE			
	Model 1	Model 2	Model 1	Model 2
Household borrowed from any source	0.197* (1.67)	–	0.513** (2.30)	–
Household borrowed from commercial banks	–	0.130 (0.44)	–	−0.181 (−0.36)
Household borrowed from microfinance	–	−0.004 (−0.05)	–	0.410 (0.87)
Household borrowed from cooperatives	–	0.195* (1.66)	–	0.547** (2.23)
Household receives money through mobile money account	0.058 (0.67)	0.067 (0.77)	0.093 (0.45)	0.118 (0.56)
F-statistics	F(18, 471) = 1.84	F(20, 471) = 1.63	F(18, 471) = 4.53	F(20, 471) = 4.53
P>F	0.021	0.043	0.000	0.000

FE = fixed effect, OLS = ordinary least squares.

* and ** refer to statistical significance of 10% and 5% (or better), respectively.

Notes: Borrowing from formal and semi-formal sources during last 12 months are considered. Borrowing from mobile money accounts is not reported because of too few observations. Regression controls for household characteristics such as age and sex of head, household agricultural landholding, housing construction and sanitation variables, agriculture inputs, and exogenous shocks that the household faced in last 12 months.

Source: Uganda National Panel Survey 2019/2020 (World Bank 2021).

In contrast, while borrowing from cooperatives is highest among farmers (some 90% of households borrowed actually borrowed from cooperatives), we find a significant effect of borrowing from cooperatives on crop income, income from poultry, and hence, total farm income. Cooperative borrowing increases crop income by 44.5%, poultry income by 19.5%, and total farm income by as much as 55.0%.

Households receive remittances from relatives via mobile financial services. Over 60% of the surveyed households received remittances, for which we expect some impact on the household's earned income. Often, remittances go to support consumption, but they may be used for productive investment too. Findings from fixed-effects estimates show that remittances seem to enhance all sources of income including total farm income, but the coefficients are statistically insignificant.

7.5 Conclusion

Agricultural finance policies in low-income countries often face two fundamental constraints: (i) lack of adequate access to a network of financial institutions and (ii) unavailability of adequate liquidity at the financial institutions in rural areas. In other words, bottlenecks exist in the financial service delivery system, such as limited access to tailored credit to meet farmers' needs (both short-term and long-term) and insufficient incentives for savings mobilization and credit delivery through the existing financial network. Low financial literacy among borrowers has also been identified as a barrier to better access to financial services in rural areas (World Bank 2014b).

This chapter explored alternative veins through which formal and semi-formal financial services—particularly cooperatives and microcredit—in sub-Saharan African countries could help farmers. Many countries lack institutional access to finance because of low coverage of financial institutions resulting from a sparsely distributed population as well as lack of funds to support financial inclusion in rural areas. But a greater range of investments, in addition to financing, is necessary to improve agricultural productivity and to allow farmers to earn cash more sustainably. Farmers are mostly smallholders and get low levels of investment in terms of agricultural inputs such as fertilizer, as well as technology.

Drawing on examples of two major economies in SSA, we find that because of higher penetration of mobile technology in Uganda than in Ethiopia, we see a higher rate of financial inclusion in Uganda, but we do not necessarily see a higher level of access to institutional finance for enhancing farm productivity. Nonetheless, we have explored how the digitalization of financial services in recent years, especially in Uganda, has helped target agricultural households with improved access to financial services such as savings and having a financial account. Smallholder agriculture in both countries is primarily rain-fed and therefore easily affected by adverse weather; weather shocks can cause substantial losses to farmers. Poor farmers can therefore be averse to borrowing, for example, due to fear of not being able to repay those loans.

In this chapter, we have examined the relevance of a financial inclusion strategy for smallholders in agriculture. Household survey data show that rural households have low access to institutional finance (i.e., banks, MFIs, and cooperatives). Econometric analysis suggests that improved access would mean higher access to institutional finance at the household level, which in turn would lead to higher farm income and productivity. The findings, therefore, support the relevance of a financial inclusion policy. However, expanding rural branches of commercial banks may not help the cause. In fact, improved access to cooperatives matters more than improved access to commercial banks or even MFIs when it comes to enhancing farm productivity via improving financial access. Agricultural finance policies must establish an appropriate delivery mechanism that generates greater rural inclusion, productivity, and welfare for smallholders.

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CHAPTER 8

Dualism and Innovation in Agricultural Finance: Lessons from Latin American Countries

Jonathan Haughton

8.1 Introduction

Latin America, with 650 million people, is sometimes referred to as the "breadbasket of the world." In 2021, it exported $271 billion worth of food, compared to just $115 billion of food imports. While the region has long been a net exporter of food, as Figure 8.1 shows, its contribution has increased dramatically over the past two decades, evidence of a dynamic and increasingly export-oriented agricultural sector.

Figure 8.1: Food Exports and Imports, Latin America and the Caribbean, 1990–2021

Source: World Bank World Development Indicators database.

At the same time, the great majority of farmers in Latin America operate on a very small scale. For instance, in Brazil, there are 5.2 million farms; the 0.9 million commercial farms occupy 76% of the land, while the remaining 4.3 million family farms manage the remainder. The World Bank (2020) states that almost half of the agricultural land in Latin America and the Caribbean (LAC) is controlled by large-scale commercial farms. They cite one study that suggests that there are about 15 million family farms in the region, with 10 million families living on an average of 10 hectares, and 1 million with farms that average 100 hectares each. Women control between 8% and 30% of agricultural land, with the proportion varying by country (World Bank 2020: 80). Many small-scale farmers lack security of land tenure: only half of the land parcels in Brazil are registered, and only 5% are registered in Guatemala.

Agriculture in the region has an enduring dualism, and this presents a challenge for agricultural finance: on the one hand, financing needs to flow to the dynamic and increasingly large-scale segments, and on the other hand, there are large numbers of farmers who may not have sufficient access to financial services, and who may benefit from greater financial inclusion as a way out of poverty. Put another way, there may be a tension between the efficiency and distributive roles of agricultural finance.

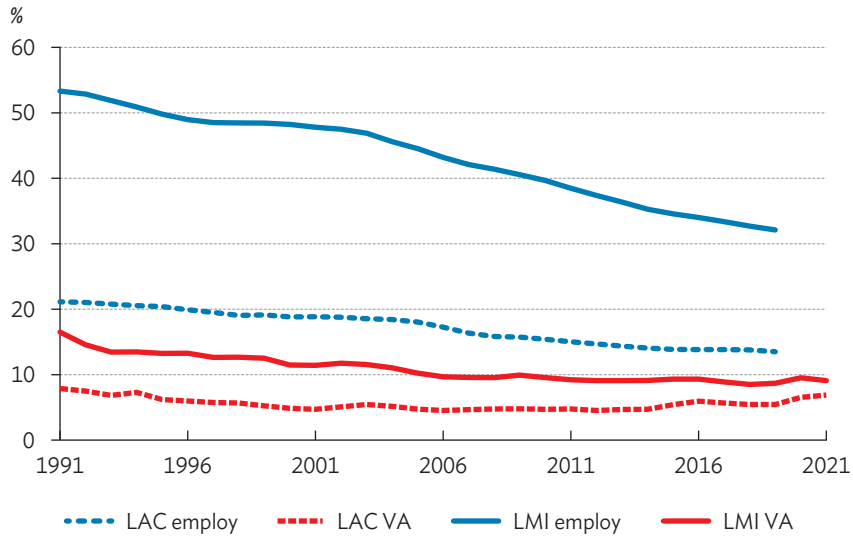
Our main focus here is on agricultural finance for smaller farms, but as Zeller and Sharma (1998) note, providing credit to small farmers can be challenging. Lenders face high screening costs, and then they have the high expense of monitoring and enforcing loans that are often unsecured. Borrowers have to devote time and provide extensive documentation in order to borrow, and even then the loans available may not fit their needs well, typically being too short to cover long-term investments. Zeller and Sharma conclude that there is a role for governments to play in encouraging innovation (such as Brazil's Pix mobile payments platform) or redesigning funding arrangements to favor poorer borrowers (as proposed for Brazil's program of finance for family farms, PRONAF). One purpose of this chapter is to identify some of the innovations, and cautionary tales, in Latin America that might have relevance in Asia and elsewhere.

We begin by painting a portrait of agricultural development in Latin America, followed by a discussion of financial inclusion of farmers. In these sections, we draw on information for a sample of countries in order to keep the treatment manageable. We then consider some interesting case studies in agricultural finance and finish with a more extended treatment of credit participation and rationing in Mexico.

8.2 Portrait of Agriculture

For Latin America and the Caribbean (LAC) as a whole, agricultural value added is about 8% of gross domestic product (GDP) and has been relatively stable over the past three decades, as Figure 8.2 shows. The share of the labor force employed in agriculture has been steadily falling and is now at 14%. This reflects both the low and rising labor productivity of the sector, relative to the rest of the economy. Similar trends are seen in low and middle-income economies, also shown in Figure 8.2.

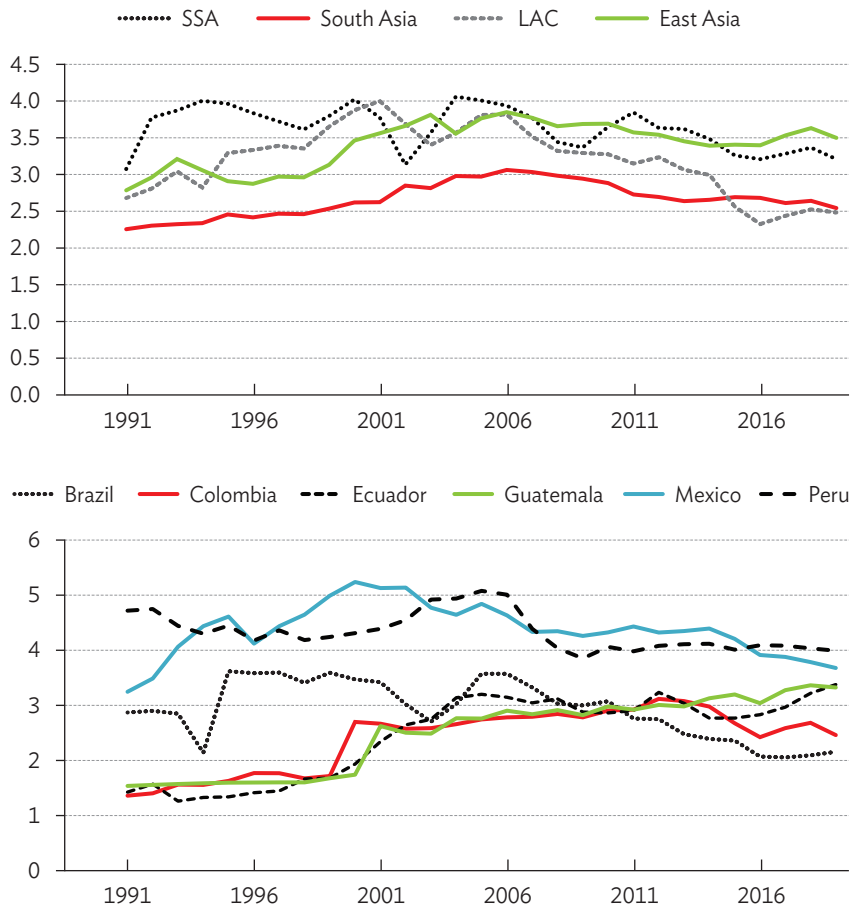
Figure 8.2: Share of Agriculture in Employment and Gross Domestic Product in Latin America and the Caribbean, 1991–2021



LAC = Latin America and the Caribbean, LMI = low and middle-income, VA = value added.

To examine these trends further, in Figure 8.3, we graph the ratio of the national shares of agricultural employment to agricultural value added. The top panel provides information on four regions: LAC, sub-Saharan Africa, South Asia, and East Asia. It is striking that only in Latin America has the ratio fallen sharply since 2000, suggestive of an agricultural sector that is changing relatively rapidly.

Figure 8.3: Share of Agriculture in Employment Divided by Share of Agriculture in Gross Domestic Product, by Region (Top Panel) and for Selected Countries in Latin America and the Caribbean



LAC = Latin America and the Caribbean, SSA = sub-Saharan Africa.

The bottom panel shows this ratio for six LAC countries and shows how the experiences of individual countries in Latin America can diverge: since about 2000, there were major gains in agricultural labor productivity in Peru, Mexico, and Brazil, and a recent improvement in Colombia, but little change in Ecuador and Guatemala.

The evolution of agricultural value added over the past two decades is summarized in Table 8.1 for Latin America overall and for seven important or representative countries. Overall, agricultural value added rose by 2.6% per year between 2000 and 2021, cereal output increased by 3.7% annually, and food exports grew by 4.5% per year. These are impressive growth rates, especially given that population growth averaged just 1.2% annually over the same period.

Table 8.1: Agricultural Outcomes, Latin America and Selected Countries, 2000–2021

	Agricultural Value Added ($ billion in 2015 prices)			Cereal Production (Millions of tons)			Food Exports ($ billion in 2015 prices)		
	2000	2021	Growth	2000	2021	Growth	2000	2021	Growth
Mexico	28.3	41.8	1.9	27.7	36.4	1.3	10.2	39.6	6.7
Peru	8.2	16.0	3.2	3.5	5.4	2.1	4.2	10.7	4.6
Brazil	43.8	88.8	3.4	47.1	125.6	4.8	27.3	92.7	6.0
Colombia	11.7	20.6	2.7	3.5	4.9	1.6	5.2	7.8	2.0
Ecuador	5.2	10.4	3.4	1.9	2.7	1.8	5.4	11.1	3.4
Guatemala	3.9	6.9	2.8	1.1	2.0	2.6	4.7	6.1	1.3
Nicaragua	1.3	2.5	3.0	0.7	0.9	1.4	1.4	2.9	3.5
LAC	186.7	321.0	2.6	134.3	289.5	3.7	119.3	300.7	4.5

LAC = Latin America and the Caribbean.

Notes: "2000" is the average of 1999 and 2000; "2021" is the average of 2020 and 2021. Growth rate is annualized percentage growth from 1999/2000 to 2020/2021.

Source: World Bank Development Indicators DataBank.

By any of these measures, Brazil was the star performer during these two decades, but all but one of the countries listed saw annual increases in agricultural GDP of at least 2.5%, so the growth was widely shared geographically.

In order to explain this strong agricultural performance, Table 8.2 sorts the countries from richest to poorest, as measured by gross national income per capita (in purchasing power parity terms). It is also worth noting that Mexico and Brazil together account for half the population, and over half the GDP, of Latin America. Most of the countries listed are middle-income, and all have levels of inequality that, as measured by the Gini coefficient of income per capita, are high by world standards. One contributor to this is the unequal distribution of land, where the Gini is 0.79 for LAC, compared to 0.56 in sub-Saharan Africa and 0.55 in Asia (World Bank 2020). Just 1% of farms control over half of all the agricultural land, so industrial-scale farming coexists with large numbers of near-subsistence small farms.

Table 8.2: Background Information on Income, Agriculture, and Trade

	Population in 2020/2021 (million)	Growth, 1999/2000 to 2020/2021 (% p.a.)	GNI/capita, PPP ($ 2017)	Gini	Share of Agriculture in 2020		Trade Bias Index, 2010	Relative Rate of Assistance, 2010	Gross Subsidy to Farmers, 2010
					In GDP (%)	In credit			
Mexico	126.4	1.3	18,154	45.4	3.85	2.08	–0.020	0.065	3.02
Brazil	213.8	1.0	13,960	48.9	5.63	0.83	–0.032	–0.154	1.02
Colombia	51.2	1.4	13,836	54.2			–0.005	0.253	3.65
Peru	33.5	1.2	11,237	43.8	6.80[a]	5.42[a]			
Ecuador	17.7	1.7	10,277	47.3	9.80	7.35	–0.389	–0.256	–1.40
Guatemala	17.0	2.0	8,483		10.24	4.53			
Nicaragua	6.8	1.5	5,057		15.77	14.41	–0.388	–0.173	–0.16
LAC	652.8	1.2	14,845						

GDP = gross domestic product, GNI = gross national income, LAC = Latin America and the Caribbean, p.a. = per annum, PPP = purchasing power parity.

Notes: Relative rate of assistance being negative indicates a bias against agriculture. Trade-bias being negative indicates an anti-trade bias.

[a] for 2014.

Sources: World Bank Development Indicators Databank (first four columns); FAO (2022) (center columns); Anderson and Nelgen (2013) for last three columns.

8.2.1 Trade

From the early 1950s, most countries in Latin America pursued a policy of import substitution, which put tariffs on imports and so penalized trade. For Mexico, Brazil, and Colombia, these barriers have largely gone, and this is reflected in a trade bias index close to zero—see Table 8.2—although Ecuador and Nicaragua have not yet reached this point.[1] The fading of protectionism has provided an opportunity for agricultural exports—a sector where Latin America has comparative advantage—to flourish.

This growth of agricultural exports has been surprising to some. After the North American Free Trade Agreement (NAFTA) came into effect in 1994, some analysts predicted that Mexico's large maize-producing sector would decline in the face of imports from the United States. This has not happened, however, and Mexico's cereal production has continued to rise, uninterrupted by NAFTA. In fact, Eakin et al. (2014) find "evidence of greater persistence and adaptability in Mexican maize farming than is often presented" (p. 133).

A more important effect of NAFTA has been the rapid rise in agricultural trade between the United States and Mexico. Four-fifths of Mexico's agricultural exports go to the United States, and the value of these exports has increased from $3 billion in 1994 to $43 billion in 2022 (USDA Economic Research Service 2024). In 2016, Mexico exported $24 billion worth of agricultural products to the United States, while comparable imports came to $19 billion.

This vigorous trade reflects the increasing specialization of Mexican agriculture. Since 1989, there have been rapid increases in the production of high-value fruit (avocados, pineapples, mangoes, tomatoes) and sugar cane, as well as chickens, mainly geared to the United States market. A similar dynamic may be seen in Peru's agricultural exports to the United States, which expanded rapidly after the signing of the United States–Peru Free Trade Agreement in 2009, in products such as grapes, mangos, blueberries, and asparagus.

[1] The trade bias index is defined as ([1 + NRAx]/[1 + NRAm] – 1), where NRA is the nominal rate of assistance (tariffs, subsidies, etc.) and refers to exports (x) and imports (m). See Anderson and Nelgen (2013).

Some countries, most notably Mexico and Colombia, are relatively supportive of agriculture, while Brazil, Nicaragua, and Ecuador have a bias against agriculture, as measured by the relative rate of assistance shown in Table 8.2.[2] Only in Ecuador is this bias strong enough to amount to a net tax on agriculture, as the final column shows. With the exception of Argentina, most Latin American countries are somewhat supportive of agriculture or at least do not try too hard to extract a surplus from the sector, and this has left the sector free to grow.

The case of Mexico is typical, and the country's changing agricultural production patterns reflect adaptation to the evolution of government policy. The level of protection accorded to agriculture—through tariffs and trade restrictions—was lower than the protection given to nonagricultural trade in the 1980s; the relative rate of assistance to agriculture was negative during this period, according to Anderson and Nelgen (2013), and trade was biased strongly against agriculture. Trade policy swung heavily in favor of agriculture in the early 1990s, but became far less distortionary around 2010, with a trade bias index of essentially zero. The implicit subsidy to farmers due to trade restrictions remains substantial, at about $3 billion or the equivalent of almost $1,000 per farm.

The Food and Agriculture Organization of the United Nations (FAO) publishes estimates of the share of formal credit that goes to agriculture (including agricultural processing and supply), and some recent information is shown in Table 8.2 (see too FAO [2022]). In all countries listed, agriculture gets a smaller share of credit than its share of GDP. The shortfall in agricultural credit is substantial in Mexico and Guatemala, where agricultural output is growing relatively slowly (and also in Brazil, where the credit figure reported by the FAO is implausibly low).

[2] The relative rate of assistance is defined as ([1 + NRAag]/[1 + NRAnonag] – 1), where NRA is the nominal rate of assistance (tariffs, subsidies, etc.) and refer to agriculture (ag) and nonagriculture (nonag). See Anderson and Nelgen (2013).

8.2.2 Farmers

As noted above, throughout Latin America, a relatively small number of large commercial farms coexist with a large number of smallholdings.

For instance, of Mexico's 3.3 million farms, only a fifth have some irrigated land. Over two-thirds of all farms are smaller than 5 five hectares and mainly produce for their own consumption ("subsistence" farmers). Just 6% of dryland farms cultivate more than 20 hectares, the cutoff at which they may be considered to be commercial farms. By this definition, Mexico has only about 350,000 commercial farms and close to 3 million farms whose landholdings are too small to provide a good living. It is in this context that Javier Usabiaga, Mexico's Secretary of Agriculture in 2001, said:

> A small farmer, no matter how productive, is not going to be able to make enough money to survive. That farmer is going to have to start transforming his crops to milk, meat or anything else. In essence, he is going to have to find another job. He is going to have to become a part-time farmer. (Thompson 2001)

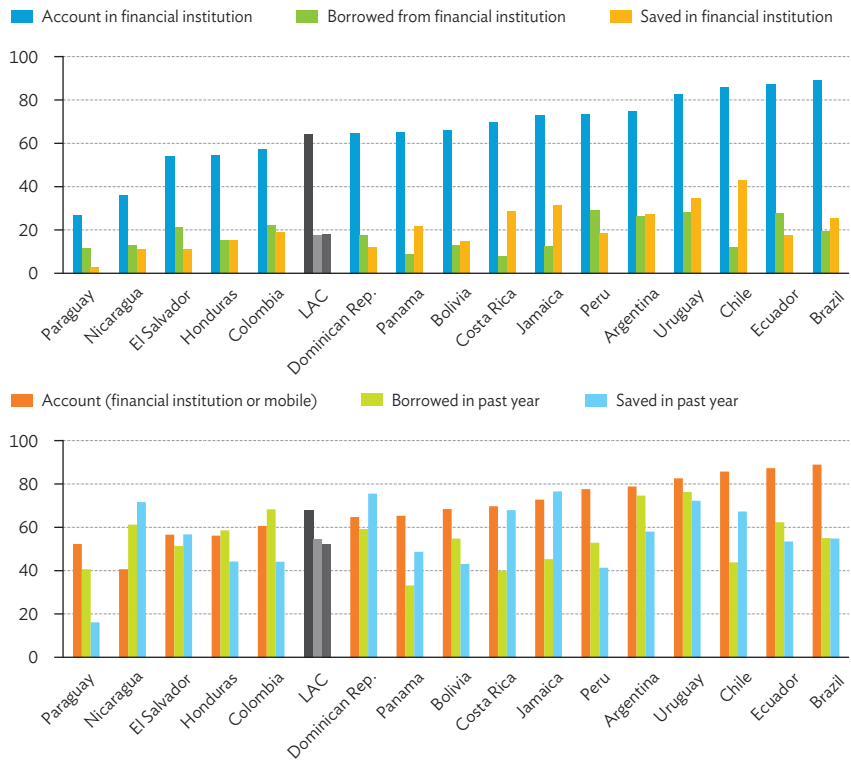
Indeed, most Mexican farmers engage in agriculture only part-time. Of the 70,311 households surveyed as part of the National Survey of Financial Inclusion (Encuesta Nacional de Inclusión Financiera, or ENIF) in 2014, 11.4% reported working in agriculture in some capacity, but only 1.08% of households earned more than half of their income from agriculture, and just 1.11% earned at least 20,000 pesos (about $1,000) annually from agriculture. Only 62% of farmers who grow crops sell any of their production.

8.3 Are Farmers Banked?

We now turn to the question of whether farmers in Latin America have access to credit. One way to answer this is to examine the data collected by the Gallup Organization for the World Bank's Global Financial Inclusion (Global Findex) database project (Demirguc-Kunt et al. 2015). In what follows we mainly report the findings of the 2021 round of the Findex.

The survey does not identify farmers per se, but it does ask whether the respondent received agricultural payments in the last 12 months, and we treat these respondents as "farmers." The starting point is to estimate the proportion of farmers who have an account with a financial institution—typically a bank—for all the LAC countries for which we have information for 2021. These are shown in the top panel of Figure 8.4, which also shows the proportion of farmers who borrowed from a financial institution or saved in a financial institution. Almost two-thirds of farmers in Latin America have an account with a financial institution, with the proportions varying from about 30% in Paraguay to nearly 90% in Brazil.

Figure 8.4: Percentage of Farmers Who Have a Bank Account (Top Panel) or Any Financial Account (Bottom Panel) for Selected Countries in Latin America and the Caribbean



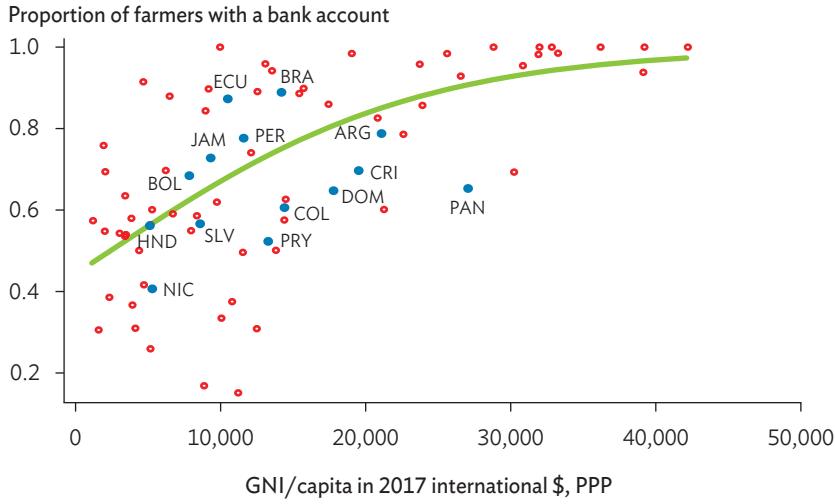
LAC = Latin America and the Caribbean.

Source: World Bank Global Financial Inclusion Database 2021 (Demirguc-Kunt et al. 2022).

While a majority of farmers have bank accounts, it is rare that more than a quarter of farmers borrow from, or save in, a financial institution. However, there are other places to turn for finance: in Paraguay, for instance, more people have mobile money accounts than accounts at a financial institution, and technological change is reducing the need to bank with a formal institution. It is also clear, by comparing the panels in Figure 8.4, that most borrowing is not from formal financial institutions, as farmers turn to informal sources such as friends and family, or semiformal sources including microfinance institutions (MFIs) and cooperatives. On average, just over half of farmers in Latin America (based on the data in Figure 8.4) have an outstanding loan. What is more difficult to determine is whether there is an unmet demand for credit, and we address this issue more fully below.

The proportion of farmers who have an account somewhere—not necessarily just with a financial institution—is in line with experience elsewhere. In Figure 8.5, we graph this proportion against GNI per capita (in purchasing power parity terms in 2017 international United States dollars) based on the Findex data for 2021.

Figure 8.5: Proportion of Farmers With a Bank Account, 2021



ARG = Argentina, BOL = Bolivia, BRA = Brazil, COL = Colombia, CRI = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, GNI = gross national income, HND = Honduras, JAM = Jamaica, NIC = Nicaragua, PAN = Panama, PER = Peru, PPP = purchasing power parity, PRY = Paraguay, SLV = El Salvador.

Source: World Bank Global Financial Inclusion Database 2021 (Demirguc-Kunt et al. 2022).

Each dot represents a country, and the curve is a logistic curve fitted to the data. Almost equal numbers of LAC countries fall below and above the line, but there are some outliers, with an unexpectedly low proportion of farmers having accounts in Panama, which has a sophisticated banking system.

There are other patterns in the Findex data, which we may examine with the help of Table 8.3. Here we focus on a selection of the LAC countries for which data were collected in 2021. In these cases, and indeed more generally, farmers are somewhat more likely than nonfarmers to have an account. In Brazil and Peru, farmers in the poorest quintiles are almost as likely as those in the top income quintile to have an account, but this is not the case in Colombia, Ecuador, or Nicaragua, suggesting that poor people may be underbanked in these last three countries. About half of those with an account have a debit card, which is a convenience; and a smaller proportion of farmers have a credit card, which can ease liquidity constraints if need be.

Although about half of farmers reported saving money in the past year (except in Nicaragua, where the figure was closer to a quarter), where mobile money services are available, these services have quickly become more popular than saving in a bank. Poor people save at only slightly lower rates than those in the top quintile, as Table 8.3 shows. In all of the countries listed, at least half of farmers reported borrowing, and the proportions were broadly similar for those in the bottom and top income quintiles.

The great bulk of agricultural payments are still made in cash, although in Brazil and Colombia, a significant number of farmers route payments to their bank accounts. The use of mobile money is growing, and as we report below, this is catching on very quickly in some countries. Part of the explanation is that in almost all countries, 90% or more of farmers have a mobile phone—a rate that is higher than for nonfarmers—and this means that the infrastructure is in place for mobile transactions. Internet access is not as widespread as mobile phones, but generally three-fifths or more of farmers do have such access.

Although most farmers have a bank account—see the top row of Table 8.3—there are still significant numbers of farmers in some countries who do not, and it is worth asking why. The essential results are shown in Table 8.4, which again is based on the 2021 Findex data.

Most respondents gave multiple reasons for not having an account, noting especially the inconvenience, high cost, and lack of need. It follows that there is unlikely to be any simple way to attract these farmers to the formal banking system.

Table 8.3: Measures of Financial Inclusion for Farmers, 2021 (%)

	Brazil	Colombia	Ecuador	Nicaragua	Peru
Has an account	89	61	87	41	78
– In poorest quintile	76	42	68	28	81
– In richest quintile	84	100	90	37	84
Has an account: nonfarmer	84	60	62	25	56
Has a debit card	59	22	44	16	43
Has a credit card	46	16	26	31	22
Saved in past year	55	44	54	72	41
– At a financial institution	26	19	18	11	18
– In poorest quintile	38	21	28	100	34
– In richest quintile	55	44	53	72	41
Borrowed in past year	55	68	62	61	53
– In poorest quintile	56	48	57	77	34
– In richest quintile	55	68	62	61	53
Borrowed in past year: nonfarmer	41	53	55	64	59
Received agricultural payments					
– Into a bank account	48	23	1	11	2
– To a mobile phone	12	4	~0	3	6
– In cash	92	75	84	95	81
Has internet access	97	63	77	57	63
– Owns a mobile phone	90	95	96	84	97
– Owns a mobile phone: nonfarmer	84	91	88	69	86

Notes: Refers to farmers, unless otherwise noted. "Farmers" are defined as those who "received agricultural payments in the past 12 months."

Source: World Bank Global Financial Inclusion Database 2021 (Demirguc-Kunt et al. 2022).

Table 8.4: Reasons Given by Farmers for Not Having a Bank Account, 2021
(% mentioning)

	Brazil	Colombia	Ecuador	Nicaragua	Peru
Too far away	34	71	49	38	54
Too expensive	51	87	53	64	58
Lack documentation	16	63	8	40	27
Lack trust	67	27	27	44	53
Religious	16	18	2	17	14
Lack money	84	84	49	62	48
Family member has an account	83	46	51	34	14
No need	50	33	11	52	57

Notes: Respondents may give more than one answer. The sample sizes for Brazil and Colombia are very small.

Source: World Bank Global Financial Inclusion Database 2021 (Demirguc-Kunt et al. 2022).

The 2021 Findex survey did not ask about the goals of borrowing, but we do have some information on this from an earlier version of the survey. In 2014, an estimated 20% of farmers and 8% of nonfarmers in Mexico reported borrowing for "farm/business purposes." This rate is comparable to that observed in the same year in Thailand, where the proportions were 18% for farmers and 10% for nonfarmers.

The financial system is not just a source of credit for production; it may also help households cope with unexpected shocks. The Findex survey asked respondents how easy it would be for households to come up with emergency funds, and if so, from where. As shown in Table 8.5, in most countries, about two-thirds of farmers would have difficulty getting emergency funds within 30 days. In Nicaragua, half of respondents would respond to a shock by dipping into savings or selling assets; in Colombia, Ecuador, and Peru, the first choice is to turn to family and friends.

The survey was undertaken in 2021, and a very high proportion of farmers reported that they were very or somewhat worried about the coronavirus disease (COVID-19). While that concern has surely abated, it is interesting to note that among the financial worries that concerned farmers, the biggest single item was medical costs; worries about funding old age were of less immediate concern.

Table 8.5: Main Source of Emergency Funds over 30 Days for Farmers
(% responding)

	Brazil	Colombia	Ecuador	Nicaragua	Peru
Difficult to get funds[a]	65	76	78	52	74
Main source of funds:					
Savings	10	8	18	31	12
Family and friends	13	52	36	17	36
Earnings	27	17	15	17	15
Bank borrowing	8	14	12	6	16
Sell assets	19	7	12	16	13
Other	7	2	7	2	
Couldn't/Don't know	16		1	10	8
Worried about COVID-19[b]	75	92	86	78	96
Financially biggest worry:					
Old age	9	33	13	30	25
Medical costs	40	43	45	32	45
Bills	44	11	18	17	14
Education	6	13	24	13	16

Notes:

[a] Either "very difficult" or "somewhat difficult" to get emergency funds within 30 days.

[b] Either "very worried" or "somewhat worried" about COVID-19.

Source: World Bank Global Financial Inclusion Database 2021 (Demirguc-Kunt et al. 2022).

The Findex data come from a comparatively small sample, and the questions are straightforward, but they do highlight several conclusions. First, while many farmers do not have a bank account, most are connected to some element of the financial system, and more than half have outstanding loans. Second, cash is still the dominant medium for agricultural transactions, although there is some evidence that this is changing rapidly, as mobile money takes root in Paraguay, Brazil, and elsewhere. Third, it remains unclear whether poor farmers are truly underserved. Their borrowing rates, both for agricultural purposes and overall, are comparable to those of better-off farmers. However, it is not enough to know simply whether someone borrowed, since this does not adequately measure the potential unmet need for credit or the sources and terms of that credit.

8.4 Sources and Uses of Farm Credit

To examine the sources and uses of farm credit, it is necessary to use farm- or household-level data, which can be hard to access. One exception is Mexico's Encuesta Nacional Agropecuaria (ENA), undertaken between October 2013 and September 2014. The unit of observation for this survey is the farm, and the results are based on 66,398 responses, representing a response rate of 88%. We set out the most important findings in Table 8.6.

According to the ENA, 12.6% of farmers requested credit for agricultural purposes during the survey period. One reason why this proportion is so much lower than the rate reported in the 2014 Findex numbers (56%) is that the latter covers loans for all purposes—including to pay for education, cover health costs, smooth consumption, and deal with funerals—while the ENA only asks about loans related to production.

Of those who asked for credit, just over four-fifths obtained credit. About half of the borrowing (by number of loans) came from a local savings bank (caja de ahorro), the FND (Financiera Nacional de Desarrollo Agropecuario Rural, Forestal, y Pesquero, formerly the Financiera Rural), or a commercial bank. The other main sources of credit were buyers of farm output or suppliers of inputs such as fertilizers, with modest amounts coming from informal sources such as family members, friends, or acquaintances. Most of the loans were used to finance crop production (94%) rather than livestock production (12%), and loans were primarily spent on farm inputs (85%) or wages and salaries (37%). Information regarding the term structure of the loans is not available, but relatively few loans appear to go to long-term investments such as machinery or animals.

For those who were denied credit, the main reasons given were a lack of guarantor or collateral, problems with credit reports, or a lack of documents or of a way to verify income. The relatively high proportion of rejections—about one in five applications for credit was denied—suggests that lenders are cautious about whom they lend to.

The great bulk of agricultural households (87%) did not apply for credit for production. The single most important reason given for this was high interest rates. The lending interest rate in 2014 was 3.6% per annum (World Bank 2015); however, this does not reflect the true cost of credit to small farm borrowers.

Table 8.6: Farm-Related Credit to Farmers: Sources, Uses, and Reasons for Denial or Not Applying, 2014

Proportion of Farm Units (%):			
Who got credit	**10.4**	**Who were denied credit**	**2.2**
of which:		*of which:*	
Source of loan		**Reasons for denial**	
Savings bank	26.4	Credit bureau problems	11.2
Rural loan fund	15.3	No guarantor	12.3
Credit union	4.3	Could not verify revenues	22.3
Pawnbroker	2.8	Lacked required documents	25.2
Bank	11.8	Deterred by high interest rate	23.2
Sectoral lender	2.4	Lacked guarantee	15.7
Buyer of farm output	16.0	Other	30.6
Supplier of inputs	12.8		
Family member	6.6	**Who did not apply for credit**	**87.3**
Friend or acquaintance	7.2	*of which:*	
Other	5.0	**Reason for not applying**	
Use of loan		Not interested	39.8
Crop agriculture	94.1	High interest rates	64.3
Livestock	11.9	Do not trust banks	27.6
Forestry and other	2.6	Too many requirements	49.6
Loan was spent on		Don't want to be indebted	45.4
Farm inputs	84.6	No, or distant, local branch	19.7
Wages and salaries	37.0	Other	4.5
Machinery and equipment	6.3		
Work animals	0.9		
Breeding stock	4.3		
Other	9.0		

Notes: Totals may exceed 100% as multiple responses were allowed. Survey undertaken from October 2013 through September 2014.

Source: Based on data provided by the Mexican Instituto Nacional de Estadística y Geografía (INEGI) at the author's request.

Verteramo Chiu, Khantachavana, and Turvey (2014) use a rate of 35% as their benchmark "market" rate for agricultural credit in September 2011 (when the lending interest rate was 4.9%); unfortunately, the ENA survey did not ask about interest rates.

Other reasons given for not applying for credit include "too many requirements"—which may refer to the need for guarantors or paperwork including verification of income—and inconvenience ("no, or distant, local branch"). Over one-quarter of those who did not apply for loans said they "do not trust banks," a figure far higher than found in Thailand or Viet Nam. The last major reason for not requesting a loan was a fear of being in debt, which was mentioned by 45% of those who did not apply for credit.

Are farmers in Mexico credit-rationed? One way to approach this question is to distinguish between three types of rationing. **Price rationing** occurs when the price of credit (mainly the interest rate) is so high that the potential borrower is priced out of the market; this is represented by a movement up along the demand curve for credit. In the ENA sample, 57% of respondents mentioned high interest rates and thus may be considered to be price-rationed.

Quantity rationing occurs when a loan request is denied. While there may be good reasons for such a denial, it has its roots in the absence of collateral coupled with asymmetric information. In short, the lender may be concerned that the borrower will not repay. In the ENA sample, 2.2% of respondents reported rationing of this nature. In the case of both price rationing and quantity rationing, an expansion in the availability of credit is likely to lead to an expansion of borrowing.

Risk rationing, a concept formalized by Boucher, Carter, and Guirkinger (2008), occurs when insurance markets are absent and "lenders, constrained by asymmetric information, shift so much contractual risk to the borrower that the borrower voluntarily withdraws from the credit market even when she has the collateral wealth needed to quality for a loan contract" (p. 409). While the ENA questionnaire did not phrase its questions in a way that would measure risk rationing directly, it is worth noting that 45% of those who did not apply for a loan said they did not want to be indebted; many, perhaps most, of these may be considered to be risk-rationed. The importance of this is that even if the supply of credit were to expand, these households would probably not respond.

If there is strong evidence that it would be in their interest to borrow—because the expected return is very high, for instance—then something other than cheap and ample credit would still be needed to change their minds. Possible solutions might include crop insurance, credit insurance, or training about the use of credit.

It is worth mentioning that in Peru, Boucher, Carter, and Guirkinger (2008) found the results shown in Table 8.7, based on a survey undertaken in the north coast of Peru in 1997 and 2003. The traditional measure of credit rationing ("quantity rationing") understates the extent to which farmers are unable or unwilling to take on a loan. While policies such as land titling can enhance collateral and reduce quantity rationing, streamlined procedures and insurance may be needed to help reduce the other types of rationing.

Table 8.7: Frequencies of Rationing Mechanisms *(%)*

	1997	2003
Unconstrained		
Price-rationed borrower	28	28
Price-rationed non-borrower	17	29
Constrained		
Quantity rationed	37	10
Risk rationed	9	22
Transaction-cost rationed	10	11

Notes: Sample of 547 farm households in 1997, of which 442 were resurveyed in 2003. Sample representative of irrigated commercial farms in the north coast of Peru.

Source: Boucher, Carter, and Guirkinger (2008), Table 3.

Verteramo Chiu, Khantachavana, and Turvey (2014) report on an interesting study that compares risk rationing among a sample of farmers in Shaanxi province of the People's Republic of China (surveyed in 2010) with a sample of farmers in the Mexican state of San Luis Potosí (surveyed in 2011). Although the samples are relatively small—730 farm households in the People's Republic of China and 372 small landowners in Mexico—the survey instruments used were identical. They found that while 80% of Chinese farmers were price-rationed, only 55% of Mexican farmers were; this is very much in line with the numbers derived from the ENA survey. However, they also estimated that 7% of the Chinese farmers were risk-rationed, compared to 35% of Mexican farmers. This is consistent with our argument that risk rationing may be extensive among Mexican farmers.

Further supporting evidence comes from a study by Bouquet, Morvant-Roux, and Rodriguez-Solis (2015), who surveyed 400 rural households in Jalisco state in Mexico. They find substantial use of credit: half of the sample used loans from shopkeepers, while 41% borrowed from financial cooperatives (which use group lending). In addition, they find significant borrowing from family and friends, as well as from banks and moneylenders. They define as risk-rationed households those that "reported not becoming a member of a [credit] cooperative or asking for a loan for fear of the consequences in case of repayment default" (p. 529). Of respondents, 44% fit this category. They also find considerable price rationing, with interest rates from some major credit sources averaging 1.8% per month (almost 22% per annum uncompounded).

8.4.1 Microfinance Lenders

State funding for farm credit has its (budgetary) limits, and private funding may shy away from small borrowers. Some of the gap has been filled by microfinance institutions (MFIs), and some relevant information on these is presented in Table 8.8 for six countries of Latin America. The data come from the World Bank's MIX database, which aims to gather information for all MFIs for all countries, every year. Unfortunately, not all MFIs report in a timely fashion, so there are gaps in the data, and thus the results need to be interpreted with caution. It should also be noted that much of the microfinance is directed to sectors other than agriculture; in the case of Mexico, for instance, it is estimated that about half of microloans are made in rural areas (although not necessarily for agriculture).

Table 8.8: Outcome of Microfinance Lenders, 2018

	Brazil	Colombia	Ecuador	Guatemala	Mexico	Peru
Borrowers (million)	3.4	2.7	1.4	0.2	7.1	5.1
Loans ($ billion)	2.1	6.07	6.60	0.15	2.99	13.14
Average loan ($)	630	2,270	4,870	610	420	2,580
Average loan (% of GNI per capita)	9	24	86	16	4	41
Loans to women (%)	54	53	50	74	75	52
Borrowers (million), 2010	0.9	2.2	0.7	0.3	4.7	3.1
Number of MFIs reporting	24	28	46	19	52	51

GNI = gross national income, MFI = microfinance institution.

Note: Data may be incomplete.

Source: World Bank MIX Market DataBank.

Based on the reported data, MFIs lent to 3.4 million people in Brazil in 2018 (Table 8.8). This is more than four times as many as received formal agricultural loans, and a fourfold increase on the number of borrowers reported for 2007. The average loan was just $630, equivalent to 9% of GNI per capita.

The importance of microfinance varies widely across the countries listed in Table 8.8. Loans in Ecuador, Colombia, and Peru are relatively large, and many of these hardly qualify as "micro" credit. But the number of borrowers is substantial, with these six countries reaching 20 million households in 2018.

Some of the MFIs are large; in the countries in Table 8.8, 24 of the MFIs have at least 200,000 borrowers each, and three have more than a million borrowers—Compartamos Banco (Mexico, 2.4 million borrowers), CrediAmigo (Brazil, 2.0 million), and AgroAmigo (Brazil, 1.25 million). These are large, professional, organizations that are able to enjoy economies of scale in their lending operations to small farm operators.

As the number of MFIs rises, competition among them rises. Naranjo Galindo (2022) found, in a study of savings and credit cooperatives in Ecuador, that increased competition was associated with a deterioration in loan quality and lower financial sustainability. This would suggest that more marginal MFIs will, in due course, be squeezed out by their larger and more efficient peers.

8.4.2 Government Funding: Mexico

As in most other LAC countries, the government of Mexico has created a number of institutions that aim to complement the activities of commercial banks in the agricultural sector. The Fideicomisos Instituidos en Relación con la Agricultura (FIRA), established in 1954, is a government-owned fund for rural development managed by the Banco de México. It is a second-tier financial institution, meaning that it does not lend directly to farmers, but it has provided funding and support for credit unions, financial societies (SOFOLES and SOFOMES), and agribusiness consulting. Its strategic objectives include fostering financial inclusion, improving productivity and efficiency, and ensuring sustainability (USDA Economic Research Service 2022). Most of the 223 billion pesos ($11.8 billion) that FIRA lent in 2017 was to subsidize loan interest, benefiting an estimated 1.5 million producers. About one-fifth covered loan guarantees, and four-fifths of the funding was routed through commercial banks.

Many small farmers borrow from the National Financier of Agricultural, Rural, Forestry, and Fishing Development (Financiera Nacional de Desarrollo Agropecuario, Rural, Forestal, y Pesquero, or FND). The FND lends indirectly, through affiliated banks and other outlets. It is barred from taking deposits and so has to seek financing from the government and international financial institutions; in 2016, the FND provided 63 billion pesos ($3.3 billion) to the farming and rural sectors, "benefiting some 492,000 producers and entrepreneurs, 71% of whom were women" (USDA Economic Research Service 2018). In 2015, the World Bank approved a $400 million loan to the FND for expanding rural finance.

Mexico also has a substantial number of microcredit lenders. For example, ProDesarrollo serves as a network for 83 organizations that together have 3,082 outlets and lend to 7.2 million people, 93% of whom are women. Mexico's best-known microlender is Banco Compartamos, with 2.4 million borrowers, 89% of whom are women; this organization follows a group lending model.

8.4.3 National Program for Strengthening Family Farming (PRONAF): Brazil

The government of Brazil created the National Program for Strengthening Family Farming (PRONAF) in 1996, and about half of farmers who have a loan have obtained it via a government program, mainly PRONAF (World Bank c.2018; see too FAO and IFAD [2017]). The Ministry of Agrarian Development channels funds via public banks, at subsidized interest rates, to the intended beneficiaries. An estimated 35% of rural credit is provided under the aegis of PRONAF, which has 13 separate programs (World Bank c.2018).

According to the World Bank, the 2017 census found that only 780,000 farmers (16%) had a formal loan; of these, about 400,000 had government-supported loans, and 320,000 of these were beneficiaries under PRONAF. To borrow under PRONAF, farmers first need a declaration of PRONAF eligibility; with this in hand, they are eligible to apply for loans at one of the 300 financial institutions that handle PRONAF funds.

PRONAF is no longer expanding, and it has been criticized for favoring wealthier regions and larger (and hence less-risky) farmers (Zeller and Schiesari 2020). Table 8.9 shows how PRONAF funds disproportionately favored the relatively affluent south, and avoided the comparatively poor northeast.

The World Bank (c.2018) reaches a similar conclusion. The program does, however, appear to have had a positive effect on agricultural production (Maia, Eusébio, and da Silveira 2020).

Table 8.9: Allocation of Funds from the National Program for Strengthening Family Farming by Region (2007) and Regional Breakdown of Farms (2006)

	North	Northeast	Central-West	Southeast	South	TOTAL
% PRONAF funds	6.4	20.6	6.3	20.6	46.1	100.0
% of farm units	9.3	50.1	5.0	16.1	19.5	100.0

PRONAF = National Program for Strengthening Family Farming.
Source: Zeller and Schiesari (2020).

The heavily subsidized interest rates made the program attractive to well-established larger farmers, and given the inherent limitations of budgetary support, this has had the effect of leaving fewer resources for poor people. It is also difficult for private credit to establish market share when farmers are used to cheap loans. The result is that the demand for credit by smaller and poorer farmers in Brazil appears to be partly unmet.

One of the larger institutions that disburses PRONAF funds is the Development Bank of Brazil (BNDES 2022). As of September 2021, it provided 9% of the country's credit, and 6% of its loans and 14% of its clients (about 80,000 in total) were in agriculture. Perhaps surprisingly, the share of credit attributable to BNDES has halved since 2016, perhaps reflecting growing competition, difficulty mobilizing state funds, and the challenge of lending to a shrinking base of farmers.

8.4.4 Who Borrows?

Relatively little information has been collected at the household level regarding household credit; when questions related to finance are included in household surveys, they are often incomplete or the survey does not collect important complementary information such as household income. That said, in this section, we marshal the available data in an attempt to determine who borrows for agricultural purposes in Mexico; more specifically, we investigate who requests such loans and, among these, who is successful at borrowing. It is likely that the findings for Mexico are broadly applicable to much of Latin America.

ENIGH data. Our first model is based on the relatively limited data available from the 2016 National Survey of Household Income and Expenditure (Encuesta Nacional de Ingresos y Gastos de los Hogares, ENIGH 2016). The survey does not ask about borrowing per se, but it does collect information on the amount that households spend servicing loans and the amount they receive from taking on a loan. This allows us to identify borrowers and to associate this information with socioeconomic and other variables. The nationally representative survey covered 70,311 households, of which 9,531 reported working in some manner in agriculture, forestry, or fishing. When household members are included, the survey reached 257,805 individuals. In what follows, we focus on the agricultural subsample. We define a borrower as a household in which someone reports servicing a loan or receiving the proceeds from a loan. Using this measure, 12.3% of households surveyed were borrowers. This is a low proportion compared to most other measures of borrowing but probably excludes most of the credit extended by shopkeepers, suppliers, buyers, and perhaps family and friends.

Tables 8.10 and 8.11 set out some summary statistics related to agricultural households that do, and do not, borrow. Probably the most striking feature is how small the observable differences are between the two groups. Borrowers have incomes that are about 30% higher than non-borrowers, mostly because they earn more from wages and salaries (Table 8.11). Borrowers are also less likely to speak an indigenous language, have somewhat more education, are more likely to be working multiple jobs, and are slightly more likely to own a phone, connect to the internet, or have a fridge. The limitations of the data do not allow us to determine the extent and nature of their holdings of land or other agricultural assets.

Table 8.10: Household Characteristics of Borrowers and Non-Borrowers

	Borrower	Not a Borrower
Overall proportions (%)	12.3	87.7
Speaks an indigenous language	22.3	29.1
No household member is literate	2.6	6.0
Head of household has:		
No education	13.2	19.5
Some primary education	33.3	34.0
Finished primary education	22.3	21.6

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Table 8.10: ***Continued***

	Borrower	Not a Borrower
Some secondary education	23.8	19.1
Some postsecondary education	7.4	5.8
Age of head of household	49.8	43.5
Head of household is male	87.4	85.2
Household size	4.6	4.1
Household lives in the countryside	72.9	73.8
Household has a member who is:		
Separated/divorced	11.5	9.2
Widowed	10.8	13.5
Working <= 20 hours per week	50.0	44.5
Working > 40 hours per week	95.2	92.0
Disabled	27.9	26.5
Working more than one job	58.7	47.1
Household has a member who has a/an:		
Phone (or cell phone)	77.1	69.6
Internet connection	7.7	6.2
Fridge	71.7	65.5
Household gets at least half its income from agriculture	7.5	9.6
Household agricultural income >= 40,000 pesos per annum	8.0	10.0

Source: ENIGH (2016).

The results of a probit model—in which the dependent variable equals 1 when the household is a borrower and zero otherwise—are shown in Table 8.12. The fit is poor, with a pseudo R^2 of 0.04. The inclusion of state-level dummy variables did not improve the fit appreciably; thus, they are not included here.

Households in small towns or the countryside are less likely to borrow; this may reflect less accessibility to a lender or a greater wariness toward borrowing. Households in which some members are working less than 20 hours per week are more likely to borrow, perhaps because they have slack labor that would be complemented with more capital. Households in which at least one member holds multiple jobs are more likely to borrow; this might provide evidence of these households' seriousness of purpose.

Table 8.11: Income Characteristics of Borrowers and Non-Borrowers

	Borrower	Not a Borrower
Household income from all sources (pesos/quarter)	29,231	22,808
of which (in %)		
Income from wages and salaries	38.1	30.8
Business income	22.7	26.7
Of which		
Agricultural	*14.7*	*18.9*
Nonagricultural	*7.9*	*7.9*
Other labor income	4.7	3.7
Capital income	2.5	2.5
Transfers received	22.5	24.6
Imputed rent, and other	9.4	11.5
Memo item		
Support from PROCAMPO or PROGAN (pesos/quarter)	904	1,186

Source: ENIGH (2016).

Table 8.12: Probit Regression Results: Dependent Variable Is Whether a Household Borrows

	Coefficient	P-Value
Medium-sized town	–0.214	0.01
Rural area	–0.227	0.00
Agricultural share of income	–0.221	0.01
Member speaks a local language	–0.021	0.61
At least one household member is:		
Literate	–0.018	0.86
Separated	0.176	0.00
Widowed	–0.036	0.54
Working <= 20 hours per week	0.129	0.00
Working > 40 hours per week	0.097	0.20
Disabled	0.074	0.07

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Table 8.12: ***Continued***

	Coefficient	P-Value
Working multiple jobs	0.205	0.00
Has a phone	0.155	0.00
Has an internet connection	–0.009	0.89
Has a fridge	0.114	0.01
Household size	0.028	0.00
Head of household has:		
No education	–0.143	0.10
Some primary education	–0.033	0.66
Finished primary education	–0.074	0.32
Some secondary education	0.035	0.62
Some post-secondary education	0.000	
Gender of head (M=1)	0.043	0.43
Age of head	–0.007	0.00
Number of paid employees	0.003	0.79
Household receives support:		
from government, has to pay	0.004	0.06
from government, free	–0.002	0.50
from private sources, has to pay	0.002	0.06
from private sources, free	0.002	0.68
from PROCAMPO (direct subsidies)	–0.016	0.01
from PROGAN (direct subsidies)	0.009	0.09
Household disburses funds:		
into bank deposits	0.003	0.25
for credit cards	0.020	0.03
to buy assets	0.002	0.50
for a mortgage	–0.016	0.34
to buy machinery and equipment	0.000	0.34
to cover business losses	0.000	0.80
Constant term	–1.146	0.00

Source: Author's calculations, based on ENIGH (2016) data.

ENA data. The National Agricultural Survey (Encuesta Nacional Agropecuaria, or ENA) of Mexican farmers undertaken in 2014 asked a number of useful questions about credit, although it is not a perfect source of information because it gathers limited information on household incomes and is awkward to use because the underlying data are not directly available to the public or researchers.[3] However, we were able to obtain information on several relevant variables at the level of the 31 Mexican states (plus the federal district); this allows us to compute "between" estimators of the effects of these variables on (i) whether a household applied for a loan and (ii) whether the loan applicant was successful.

The essential descriptive statistics are shown in Table 8.13. In 2014, 21.6% of the farmers surveyed applied for an agricultural loan, and 87% of these obtained one. Female and indigenous farmers were less likely to apply for a loan, and their applications were more likely to be rejected. Larger farmers, including those who own a tractor, as well as high-income farmers are more likely to apply for and receive a loan for agricultural purposes. Respondents who complained about high input costs or insecurity were somewhat more likely than others to apply for agricultural credit.

We find considerable inter-state variation. For example, the proportion of farmers who asked for a loan varied from less than 10% in Guerrero, Hidalgo, and Yucatán to more than 45% in Baja California, Sinaloa, and Sonora; similarly, the proportion of applicants who were refused agricultural loans was below 5% in Nayarit and Sinaloa but above 25% in Puebla and Tabasco. Wide variation, which is found in most of the potential explanatory variables as well, means that the use of state-level data may be able to yield useful "between" estimates of the determinants of loan applications and acceptances.

In Table 8.14, the left-hand panel sheds some light on who applies for a loan, while the right-hand panel examines the correlates of which loan applicants get approvals for their loans. The mean values refer to the sample used for the regression estimates; for instance, 12.1% of farmers are women but only 10.3% of loan applicants are women.

[3] We are most grateful to the staff of the Mexican Instituto Nacional de Estadística y Geografía (INEGI), and in particular to Natalia Volkow Fernández, for their help in extracting the tabular data that we requested. A summary of published results may be found in ENA (2014b).

Table 8.13: Characteristics of Farmers Who Sought Loans, 2014

	Farmer Applied for Loan		Farmer Did Not Apply for Loan	Applications Rejected
	Got loan	Refused loan		
	% of farmers in the group			*% of applicants*
Overall	**18.8**	**2.8**	**78.4**	**13.0**
By gender				
men	19.4	2.8	77.7	12.7
women	14.5	2.7	82.7	15.8
By ethnicity				
indigenous	10.4	2.4	87.2	19.0
By education				
Primary or less	17.7	2.5	79.8	12.4
Secondary (6 years)	20.8	3.0	76.2	12.6
Higher	20.7	3.1	76.3	12.9
By assets				
Owns a tractor	35.9	3.4	60.7	8.7
Gets govt. support	23.4	2.9	73.7	11.2
High-income household	43.6	3.0	53.4	6.4
Uses a bank	25.2	3.7	71.0	12.9
By type of problem				
High input costs	21.1	2.8	76.1	11.9
Disaster	17.5	2.9	79.6	14.0
Credit	12.6	6.9	80.5	35.5
Insecurity	21.9	3.8	74.3	14.6
Memo: Characteristics				
Work hours/day	7.8	7.6	7.2	
Household size	3.1	3.0	2.9	
Adults per household	2.2	2.2	2.1	
Area: rainfed (hectares)	38.1	27.6	20.5	
Area: irrigated (hectares)	35.3	19.1	22.2	

Notes: Valid responses from 62,029 farmers. The first three columns show the proportions of people in the group who got a loan, applied but were refused, or did not apply. For instance, 14.5% of women got a loan, compared to 19.4% of men.

Source: Author's calculations, based on data from the 2014 Encuesta Nacional Agropecuaria.

Table 8.14: Correlates of Loan Applications and Their Success, 2014

	Model 1: Who Applies for a Loan?				
		Simple regression		Multiple regression	
	Mean	$\hat{\beta}$	p-val	$\hat{\beta}$	p-val
Percentage of farmers who are:					
Women	12.1	–1.46	*0.04*	–1.03	*0.11*
Indigenous	22.3	–0.23	*0.02*	–0.11	*0.32*
Percentage of farmers who have:					
Primary education or less	16.4	–1.27	*0.13*		
Secondary education	39.9	0.87	*0.02*	0.34	*0.44*
Higher education	30.5	0.49	*0.32*		
Percentage of farmers who:					
Own a tractor	37.7	0.38	*0.00*		
Get government support	64.8	0.45	*0.00*		
Have high income	6.4	1.5	*0.00*		
Percentage who have a problem with:					
High input costs	94.0	0.79	*0.00*		
Disasters	76.2	–0.65	*0.01*		
Credit	23.6	–1.21	*0.00*		
Insecurity	32.0	0.18	*0.40*		
Farm characteristics:					
Total area (hectares)	107.9	0.0003	*0.04*		
Rainfed agriculture (hectares)	24.3	0.005	*0.00*		
Irrigated agriculture (hectares)	25.4	0.005	*0.00*		
Household characteristics					
Household size	2.94	–0.19	*0.00*	–0.17	*0.04*
Percentage of adults in household	72.20	0.92	*0.07*	–0.64	*0.39*
Age of farmer (years)	57.9	–0.003	*0.77*		
R squared				0.39	
Number of observations	62,029	32		32	

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Table 8.14: ***Continued***

	Model 2: Which Loan Applicants Get a Loan?				
		Simple regression		Multiple regression	
	Mean	$\hat{\beta}$	p-val	$\hat{\beta}$	p-val
Percentage of farmers who are:					
Women	10.3	−0.83	*0.12*	−0.94	*0.09*
Indigenous	18.5	−0.22	*0.03*	−0.11	*0.38*
Percentage of farmers who have:					
Primary education or less	15.3	−0.20	*0.77*		
Secondary education	43.5	−0.34	*0.29*	−0.59	*0.12*
Higher education	32.5	0.40	*0.17*		
Percentage of farmers who:					
Own a tractor	56.2	0.21	*0.00*		
Get government support	73.7	0.35	*0.00*		
Have high income	11.3	0.43	*0.04*		
Percentage who have a problem with:					
High input costs	98.9	0.45	*0.00*		
Disasters	75.1	−0.57	*0.00*		
Credit	23.4	−0.87	*0.00*		
Insecurity	37.8	−0.15	*0.40*		
Farm characteristics:					
Total area (hectares)	91.9	0.0002	*0.33*		
Rainfed agriculture (hectares)	36.0	0.002	*0.02*		
Irrigated agriculture (hectares)	32.9	0.002	*0.02*		
Household characteristics					
Household size	3.11	−0.08	*0.10*	−0.11	*0.07*
Percentage of adults in household	71.2	0.13	*0.77*	−0.13	*0.83*
Age of farmer (years)	56.0	0.003	*0.98*		
R squared				0.34	
Number of observations	13,423	32		32	

Notes: Regression results based on tabulations at the level of the 32 states of Mexico. The $\hat{\beta}$ are the estimated coefficients, from simple or multiple regressions, and "p-val" refers to the p-value. The mean values are percentages unless otherwise indicated. Of the total sample of farmers, 21.6% applied for a loan, and of these, 87% were granted a loan.

Source: Author's calculations, based on data from the 2014 Encuesta Nacional Agropecuaria.

We present results from simple as well as multiple regressions. The simple regressions take the form

$$y_i = \alpha + \beta X_i,$$

where y_i is the proportion of farmers in a state who apply for an agricultural loan (Model 1) or the proportion of loan applicants who successfully obtained a loan (Model 2) and the X_i is one of the variables listed on the left-hand side of Table 8.14. The table shows only the estimated slope coefficients ($\hat{\beta}$) and their associated p-values, which show the level of significance (with a low value denoting a statistically significant linear relationship). The results are in line with what we have already seen: women and indigenous farmers, those with a primary level of education or less, those facing disasters or credit problems, and those in larger households are less likely to apply for a loan. If these groups do apply, they are also less likely to be approved for the loan, which in turn may help explain why they are less likely to apply for a loan in the first place.

For three reasons, it is not feasible to include all 18 variables shown in Table 8.14 in a multiple regression. First, there are only 32 observations (one per state), so the resulting regression would only have 13 degrees of freedom. Second, there is strong multicollinearity, so separating the effects of one variable from the next is challenging. Third, not all of the variables listed here are clearly independent or truly "explanatory." For instance, owning a tractor is strongly correlated with applying for, and getting, a loan; however, tractor ownership also reflects other, potentially more fundamental, influences such as the size of the farm and the educational level of the farmer. Thus, we have chosen a limited number of variables (five) that may reasonably be considered exogenous and use these to estimate multiple regressions. These "explain" over one-third of the state-to-state variation seen in the proportions of farmers who apply for loans and who receive a loan. Two of the explanatory variables appear to matter consistently. Specifically, larger households and female farmers are less likely to apply for or get loans. Regressions based on the observations of individual farmers, rather than on the state-level aggregates, would allow us to disentangle the effects with more precision and would be well worth estimating.

8.5 Innovations and Recent Developments

8.5.1 Pix: Brazil

In late 2020, the Central Bank of Brazil introduced Pix, an instant-payment platform wholly run by the Central Bank. The public has adopted Pix more rapidly than any comparable scheme elsewhere: from 41 million users in November 2020, Pix came to be used by 124 million users by March 2022, representing two-thirds of the adult population (World Economic Forum 2022). An estimated 800 payment service providers, such as banks and other financial institutions, participate in making Pix available to the public, in the same way that financial firms work with the private Zelle platform in the United States.

The remarkable success of Pix is due to several factors. The Central Bank ended WhatsApp's own instant payment scheme and forced banks to use Pix. The system is very cheap, with no charges for consumers, minimal fees for payment service providers, and a fee of 0.22% for merchants (compared to 2.2% for credit cards). An estimated 9 million companies, or three-fifths of all firms with a relationship with the financial sector, had signed up by March 2022. The system is also easy to use, with consumers needing just a phone number, e-mail, or QR code in order to sign on. The government now uses the system to pay transfers such as the Bolsa Família. The rapid buy-in has created strong network effects, so that other instant-payment platforms have essentially been squeezed out, but payment service providers can innovate in the products they provide.

Mondato (2022) argues that the rapid success of Pix is also the result of good design. The Central Bank of Brazil, unlike the Central Bank of Mexico, was able to enforce no-fee transactions among banks. By running the scheme itself, it created a platform that included a wide swath of financial institutions, unlike the public–private partnerships in instant payment schemes in Asia, where noncommercial financial intermediaries were excluded as a result of high transaction fees. The widespread use of mobile phones in Brazil also provided the necessary infrastructure.

8.5.2 Index Insurance: Peru

Very few small farmers buy crop insurance, even when it is available. The problem is that this deters lenders, who fear that in the event of a negative shock, they may not be repaid. For instance, in 1998, a year of the El Niño–Southern Oscillation (ENSO), the default rate on agricultural loans in the Piura region of northern Peru jumped from 8% to 18% (Skees and Collier 2010). The area is prone to severe flooding in an ENSO year.

While traditional insurance pays out in proportion to the damage done, index insurance links compensatory payments to an index. In Peru, an insurance company has begun to sell ENSO insurance that is linked to the temperature of the sea surface. The product is seen as "business-interruption" insurance, and it is likely to be of interest to companies that serve farmers—lenders, cooperatives, suppliers, local governments—rather than to small farmers themselves. To spread the risk, the company also uses reinsurance. Whether insurance of this kind will gain traction is not yet clear, but a recent World Bank report on agriculture in LAC sees a role for it (World Bank 2020).

8.6 Conclusion

Mobile money is revolutionizing payments, and when the details are worked out carefully, it is quickly embraced by the public, as recent Brazilian experience shows. This change has the potential to create a revolution in providing credit to poor households, including farmers, because it helps address two of the key problems that restrain microlending—screening costs and inconvenience. For lenders, detailed information obtained from the patterns of use of mobile money will make it easier and cheaper to screen potential borrowers; and for borrowers, the use of mobile phones can reduce the time and inconvenience of having to go to a physical location every time one applies for a loan.

The evidence on credit rationing is mixed. In Latin America, most farmers have some form of engagement with the financial system, although not necessarily with a bank. In some countries, interest rates are kept low through public subsidies, which reduces price rationing, but the resulting low profitability for lenders may decrease the supply of lending, which increases quantity rationing.

For governments that support lending to rural or farm households—such as Brazil and Mexico—there appears to be scope for better targeting the subsidies to poorer farmers. There is a growing recognition of the importance of risk rationing, where borrowing may be profitable on average, but the risks in the case of a shock are too great. Very few farm households carry any form of production insurance—just 3.6% in Mexico, for instance (ENA 2014a). A promising direction is to expand the availability of index-linked insurance for the institutions that serve farmers, including suppliers, lenders, cooperatives, and local governments; a Peruvian insurer is experimenting with ENSO-indexed insurance, and there other experiments in Mongolia and Viet Nam.

Most farms in Latin America are relatively small, and a majority of farmers supplement their production with earnings from other sources; in Mexico, only 1% of households derive more than half of their income from farming, although 11% of households work in agriculture at least to some extent. As the nonagricultural sectors continue to grow, the movement of labor out of agriculture will continue. While credit for productive purposes—inputs, equipment, working capital—will still be essential for commercial farmers, the financial needs of small farmers appear to be somewhat different: borrowing is largely to smooth consumption and cover unexpected expenses, and the system of payments and transfers needs to be cheap and convenient. The great diversity in engagement in agriculture makes it difficult to determine how much finance would be appropriate for the sector.

Most Latin American governments, including those of Mexico and Peru, have opened up the agricultural sector to trade, which has led to greater specialization in high-value export-oriented crops, an important source of dynamism over the past two decades. Most LAC governments also continue to subsidize agriculture, in part through low-interest loans and loan guarantees. However, there appears to be some ambivalence about this support, and some officials argue that a focus on agriculture per se will not do much to raise the incomes of poor households, and that policy relating to agriculture should be de-linked from systematic efforts to address poverty.

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CHAPTER 9

Digital Financial Services for Agriculture

Shahidur R. Khandker

9.1 Scope of Digital Finance in Agriculture

Better access to institutional finance is important for running a modern economy. This is equally true for both farming and nonfarming communities. There are four categories of financial services offered by financial institutions that can satisfy the unmet demand of rural households, especially women and smallholders: credit, savings, insurance, and payments (such as mobile money for bill payments and remittance transfers). Credit, especially through microlending schemes, is common in many countries for lending small amounts of money to rural and other disadvantaged people such as women.

As for the other categories of financial services, savings services allow farmers to increase their financial assets by encouraging and offering a secure environment for saving money, even in a small amount, and withdrawing deposits when needed. Insurance for crops and livestock helps reduce farmers' risk of losses from shocks or extreme weather conditions. Mobile money services (both payments and transfers) allow people to send and receive money electronically using mobile phones (Biscaye et al. 2015). Except for mobile money services, most of the other financial products use non-digital delivery methods such as branch banking. In order to offer more efficiency (measured in terms of both price and time), digitalization of such bank-run financial services is necessary.

Access to digital forms of finance is indeed the hallmark of a modern economy. Saving money, getting access to credit and insurance, sending money, and carrying out other categories of transactions using digital channels—such as cards, internet, and mobile phones—are the essence of digital financial services (DFS). In recent years, the introduction of DFS has alleviated constraints to financial access for many who did not have such access before; these services consequently help enhance the extent of overall financial inclusion as well as reduce the cost of providing financial services (Pazarbasioglu et al. 2020).

Of course, greater financial inclusion means more reliance on smooth and safe transactions of payments, savings, borrowing, and remittances as well as better plans for emergencies and productive investments. Digital access to such financial services can not only enhance efficiency in transactions but also provide a platform for those who lack physical access to financial institutions such as banks and microfinance institutions (MFIs).

Financial services carried out using digital technologies are referred to as "fintech" in the literature. This term refers to financial services carried out via web, mobile, cloud services, and other new technologies. The most common form of DFS in developing countries is mobile financial services (MFS), which rely on mobile phone technology to deliver secured, fast, and inexpensive financial transactions such as payments and money transfers. In addition, transparency of MFS transactions reduces fraud, contributing to government tax revenue. Thus, as mobile phones are the most extensively used and functionally adaptable method of DFS in developing nations, "mobile money" can be an important instrument for the digitalization of agricultural finance designed to reach smallholders, who cultivate more than 80% of the land but have very limited or no access to physical bank finance (e.g., USAID 2014).

Why are MFS/DFS better tools than non-digital banking? DFS are in general characterized by low marginal costs per account or transaction, so they can bring economies of scale and reduce the cost of a financial transaction. For example, while the average cost of sending home $200 in cash is about $14 via the formal banking system, the average cost would be only a fraction of this cost via DFS (Pazarbasioglu et al. 2020). Digitalization of banking also reduces the cost of operation. A study of a South Indian bank shows that the bank saves more than ₹13 per transaction in a banking operation just by shifting branch transactions to digital channels.[1] So, digitalizing financial services is a cost-effective way of carrying out payments or transferring cash.

In many developing countries with limited physical financial access, digital financial services such as MFS have managed to enhance payments, money transfers, or insurance purchasing. MFS have leveraged the high mobile phone penetration in many developing countries to deliver money transfers at very low costs.

[1] For details on cost estimates, see Philippon (2020).

MFS have enhanced financial inclusion simply via mobile technology—two-thirds of the world's 1.7 billion adults without access to formal financial services have a mobile phone. More specifically, there are over 850 million registered mobile money accounts across 90 countries with $1.3 billion transacted daily via these accounts. Even though MFS have been in operation for just a decade, more than 70% of the transactions in mobile money systems are basically cash-in or cash-out types (Pasti 2019).[2] In other words, MFS are dominated by payments or remitting money, and they are used very little for lending or other categories of financial services.

Mobile money has helped people to remit money and receive money or government transfers, which has opened the door for speedy monetary transactions in several directions: person to person (P2P), person to government (P2G), and government to person (G2P). MFS users are better able to manage financial risk from various factors including climate change. For example, in Kenya, MFS users who experienced an unexpected income and consumption shock were able to reduce such shocks via remittances sent by relatives from distant geographical areas (Jack and Suri 2014). Similarly, in Bangladesh, millions among the unbanked population—especially among poor people and those in remote and rural areas—have greatly benefited (in terms of consumption and income smoothing) from MFS thanks to the high penetration of the mobile phone network into all corners of the country (Murshid et al. 2020). Starting their operations in 2010 in Bangladesh, MFS now have an outreach of 180 million registered customers, the majority of them in rural areas, with a transaction volume exceeding Tk29 billion per day in 2021. MFS also help reduce gender disparity in access to financial services and enhance women's empowerment in the process.

[2] In fact, in most cases (87% of global transactions), customers use digital finance to send/receive money or buy airtime (Kienzle 2015). No doubt, there are many more mobile money accounts than bank accounts in many countries in Africa and Asia, and hence, they are drivers of enhanced financial inclusion.

9.2 Benefits of Digital Financial Services in Agriculture

A growing body of literature from Sub-Saharan Africa (SSA) and South Asia (SAR) shows that DFS, mainly person-to-person (P2P) and government-to-person (G2P) transactions, help boost income and consumption, reduce poverty, and enhance resilience to absorb short-term shocks such as health and natural hazards (e.g., Jack and Suri [2014] on M-PESA in Kenya and Murshid et al. [2020] on bKash in Bangladesh). For example, in Kenya, MFS are found to reduce extreme poverty by 22 percentage points among female-headed households and lift 2% of the households out of poverty. In Bangladesh, bKash helps increase per capita income by some 6%. More importantly, the risk mitigating impacts of bKash are substantial: It helps smooth income and consumption with more pronounced effects due to health and natural shocks (such as floods). At the macro level, MFS account for a large volume of transactions that takes place in everyday business and remittance transfers across households. Simply by lowering reliance on cash handling, MFS transactions generate gains up to 2% of the gross domestic product in the developing world (Pazarbasioglu et al. 2020).

A few studies have evaluated digitalized credit and savings programs. In Kenya, a mobile savings and loan service known as M-Shwari was introduced in 2012 by the Commercial Bank of Africa that combines M-Shwari accounts with the M-PESA mobile financial service accounts.[3] M-PESA uses mobile phone technology to deliver payments and money transfer services, but it does not offer lending or savings services. By 2019, M-Shwari reached 16 million customers accounting for 70% of the adults in the country. An evaluation of M-Shwari lending shows that access to the mobile banking services of M-Shwari has improved resilience against shocks that would otherwise have forced households to cut back expenditures on education and health. However, access to M-Shwari does not replace access to loans from formal or informal sources. This is not surprising, given that M-Shwari offers very small loans for a very short period, such as 30 days, and thus, may be quite useful during times of high needs (Bharadwaj, Jack, and Suri 2019). Another study of M-Shwari, using a regression discontinuity method, estimates the impact of a promotional scheme of individual loans and savings.

[3] M-Shwari, introduced in 2012, is a digital microcredit platform of M-PESA, the leading MFS provider in Kenya.

Findings show that lending increased during the promotion period, but savings, while increasing at the beginning, declined soon after the promotional period ended (Bharadwaj and Suri 2020).

Lee et al. (2019) studied mobile money transfers of garment workers in Dhaka, Bangladesh, who used bKash as opposed to traditional methods to send money to families back home. The study finds significant effects of mobile money transfers on health, education, and the extent of borrowing. More specifically, for active users of bKash, remittances sent from urban centers to rural areas increased by 26%, which resulted in an increase of consumption by 7.5%. Another study carried out in Uganda shows that the expansion of mobile money agents doubled the nonfarm self-employment rate among users, reduced travel costs (expressed as a percentage of per capita expenditures) by 10 percentage points, and reduced food insecurity (Weiser et al. 2019).[4]

9.3 Why Is Digitalization of Agricultural Finance Necessary?

Farmers, especially smallholders, around the world are highly constrained in the credit market and in access to other forms of financial services. They are also vulnerable to serious negative consequences of climate change and other covariate risks. Yet two-thirds of adults who live in poverty rely on agriculture as a source of income, and frequently they lack the means to maximize yields and address production constraint issues including unfavorable weather, crop pests, and diseases, all of which have been made worse by climate change (GSMA 2022).

Overall, the evidence suggests that financial products generally have a positive impact on consumption, food security, income, production, and resilience for rural and agricultural households (e.g., Anderson 2015). Results from the study by Peprah et al. (2020) show that financial inclusion significantly increases productivity. Thus, for inclusive finance and sustainable agricultural production via higher yields, smallholder farmers' access to financial services (including loans, savings, and insurance) must be increased. Another study conducted in Ethiopia

[4] For more on the randomized controlled trial studies, see Karlan et al. (2016).

demonstrates that access to credit services improves the technical efficiency of small-scale maize producers and allows them to achieve the highest possible output level from a given set of inputs (Koricho and Ahmed 2021).

According to a recent study, smallholders in low- to middle-income countries are estimated to have an annual loan demand of $238 billion (or 8% of the gross domestic product's share of the agricultural industry). But only a third of this need is being satisfied (IFC 2022). One of the reasons might be the difficulty for financial institutions to reach farmers in rural areas and the long distance to financial institutions from farmers' homes. For instance, Witte et al. (2015) found that longer distances to both branch and field offices significantly reduce the volume of new loans.

With substantial evidence of the multidimensional dividends accrued from DFS, it is obvious that agricultural finance offered to smallholders by financial institutions should be digitalized. MFS can, for example, make financial services more accessible in rural areas, where traditional banking services might not be available, and minimize the cost of money transfers, which may be particularly costly if carried out using non-digital methods. Financial services now have new options to connect with rural customer segments in the agriculture sector thanks to innovations in DFS and other digital tools. In an area with low customer density and high transportation costs to physically reach and serve customers, digital technologies can help create less expensive scenarios to gather and process information, attract customers, develop and distribute products, and manage services (IFC 2022).

More importantly, the continued usage of cash in agricultural value chains exacerbates inefficiencies as well as insecurity. One of the top three major obstacles to increasing agricultural production is cash-based value chains and market inefficiencies, with large transactions that take place within these value chains (IFC 2022).

Digital payment systems address the inefficiencies of cash-based transactions by reducing the time and expense of having to travel to make transactions, speeding up the payments to intended recipients, and lowering the risks of theft and fraud associated with carrying cash on long trips (Pazarbasioglu et al. 2020). By enhancing the simplicity and transparency of accounting, DFS provides underserved farmers a point of entry to more comprehensive and efficient financial services.

It is not only farmers who benefit from digital finance. Agribusinesses and other actors in the agricultural value chain also benefit from DFS/MFS by avoiding the inefficiencies and lack of transparency that come with cash transactions while addressing a variety of business concerns, maximizing operational efficiencies, and bringing real-time insights into the supply chain.

Another area in which digital financial services such as MFS can have a significant influence is the utilization of inputs and farm outputs. Indeed, studies suggest that the adoption of mobile money technology increases farmers' use of fertilizer, herbicides, and output by roughly 18%, 13%, and 4%, respectively, in comparison to non-adoption of mobile money transactions (e.g., Abdul-Rahaman and Awudu 2022). Access to financing has a favorable and considerable impact on the amount of fertilizer and herbicide farmers use as well as the produce on their farms.

Moreover, digital finance can help manage health risk due to conditions such as the coronavirus disease (COVID-19). A study carried out during the COVID-19 pandemic finds that digital financial services significantly contributed to safeguarding the People's Republic of China's agricultural supply lines. The empirical findings demonstrated that the level of financial inclusion in the digital space significantly benefited trading in agricultural goods. More specifically, agricultural commerce rose by about 1.6% for every 1% increase in digital financial inclusion during the pandemic (Fang and Zhang 2021). This means the digitalization of agricultural finance can help smallholders to mitigate unexpected shocks and disruptions.

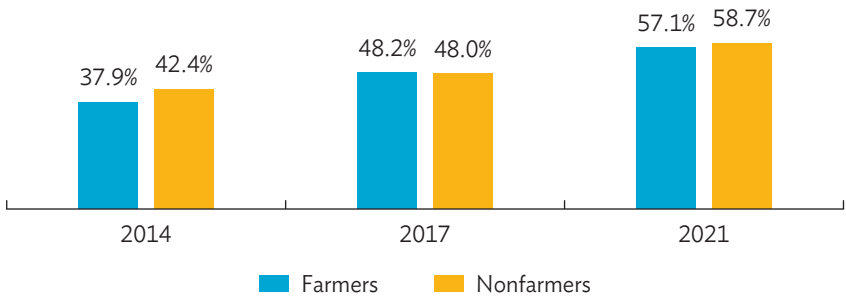
Finally, there are new categories of digital data that can supplement conventional agricultural data from, say, crop harvests, thanks to sophisticated and more widely accessible sensors, satellites, and other instruments (Pazarbasioglu et al. 2020). This information has the ability to aid in timely decision making for agricultural actors. It can also help external actors such as financial service providers in understanding the industry and the possible risks to investors. The information system created in the process can also be used to develop an array of insurance products appropriate for the given context and necessary to aid the farming community (including small agribusinesses) in the event of uncertainty with climate changes. Digital technology such as mobile technology can augment farmers' insurance take-up and help them to pay insurance premiums on time.[5]

[5] For details, see Robles (2021).

9.4 Current State of Digital Finance in the Developing World

The Global Findex data collected by the World Bank over the years since 2011 provides a snapshot of the increasing level of financial inclusion realized in the developing world and higher financial access by smallholders in agriculture. As Figure 9.1 shows, financial inclusion (defined by whether one has an account with a financial institution such as a bank, credit union, or MFI or an account with mobile financial services) among farmers in the developing world was 37.9% in 2014 compared to 57.1% in 2021.[6] The corresponding numbers for nonfarmers are 42.4% and 58.7%, respectively. These numbers show that farmers gained as much access to financial services as those not directly involved in agriculture over the past years.

Figure 9.1: Financial Access by Farmers and Nonfarmers across Years



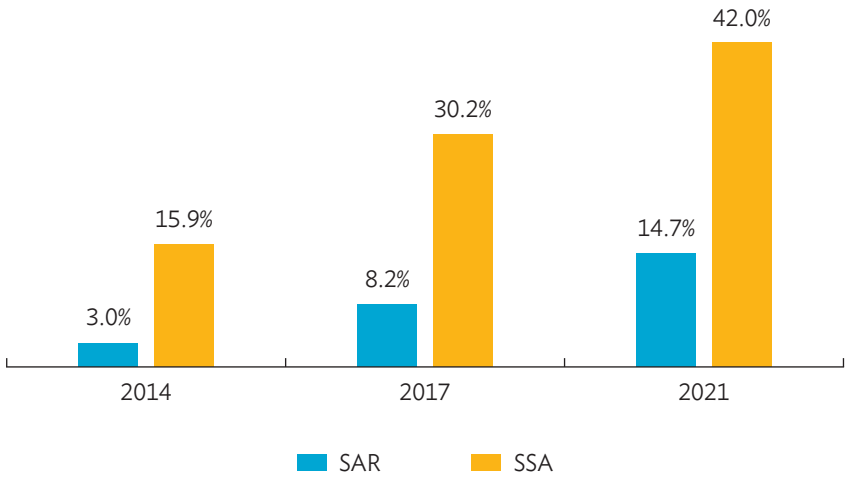
Sources: World Bank Global Financial Inclusion database, 2014–2021 (Demirguc-Kunt et al. 2015; Demirguc-Kunt et al. 2018; Demirguc-Kunt et al. 2022).

One of the key factors underlying the increased level of financial inclusion is the increased coverage of mobile money services (MFS) across developing countries. Farmers, a consumer category that was previously considered too challenging and costly for traditional financial services to reach, are now accessible via mobile phones. For example, in 2021, farmers' access to financial institutions was 45.0% compared to 52.2% among nonfarmers.

[6] See definition of farmers in footnote 5 of Chapter 2.

But famers' access to MFS was 30.4% in 2021 against 23.0% among nonfarmers. Most of the expansion in financial inclusion through mobile money was attained in SSA. For example, in 2021, among farmers, MFS account expansion was 42.0% in SSA compared to only 14.7% in SAR (Figure 9.2). For the same period, the financial inclusion rate among farmers due to increased access to financial institutions was higher in SAR (53.0%) than in SSA (32.8%).

Figure 9.2: Mobile Financial Service Access by Farmers in South Asia and Sub-Saharan Africa, Across Years

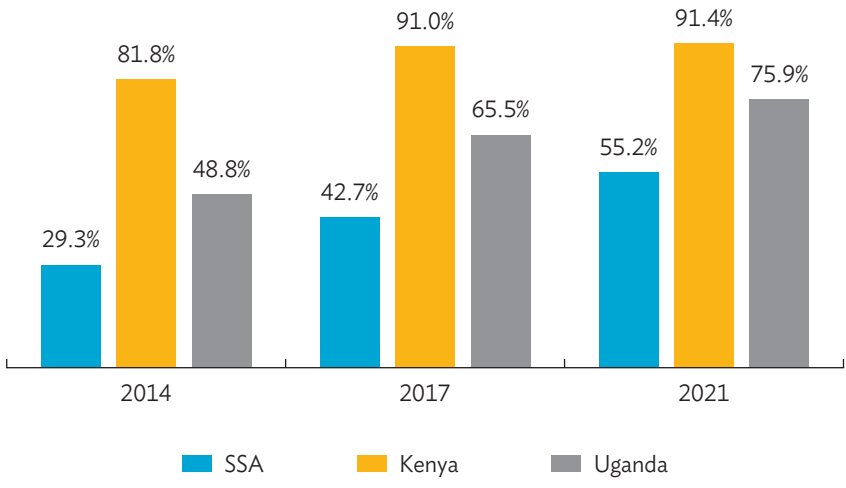


SAR = South Asia, SSA = Sub-Saharan Africa.

Sources: World Bank Global Financial Inclusion database, 2014–2021 (Demirguc-Kunt et al. 2015; Demirguc-Kunt et al. 2018; Demirguc-Kunt et al. 2022).

Thus, most of this MFS expansion has been concentrated in the SSA region, especially in East Africa, where the use of mobile money is more widespread. For example, 49 of the SSA region's 111 digital financial services for the agricultural sector are from just five nations: Burundi, Kenya, Rwanda, Tanzania, and Uganda. As Figure 9.3 shows, while the average rate of financial inclusion among farmers in SSA in 2021 was 55.2%, it was 91.4% in Kenya and 75.9% in Uganda. This was primarily due to expansion in MFS coverage.

Figure 9.3: Access to Finance by Farmers in Sub-Saharan Africa, Kenya, and Uganda, Across Years



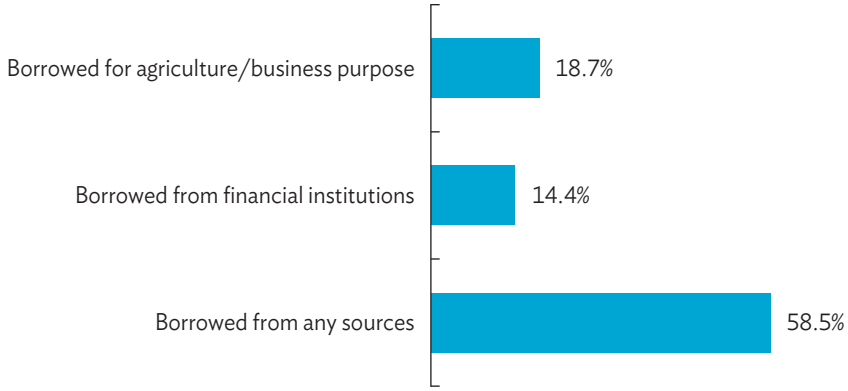
SSA = Sub-Saharan Africa.

Sources: World Bank Global Financial Inclusion database, 2014–2021 (Demirguc-Kunt et al. 2015; Demirguc-Kunt et al. 2018; Demirguc-Kunt et al. 2022).

The mere fact that farmers have expanded financial inclusion via mobile technology does not mean that farmers have increased access to institutional finance, where institutional credit access as per demand, for example, can help increase farmers' food security and ensure enhanced farm productivity via better utilization of inputs, especially modern inputs such as fertilizers. Figure 9.4 shows the trend in farmers' access to institutional finance. While 58.5% of the farmers borrowed from any source in 2017 in the developing world, only 14.4% borrowed from financial institutions, and only 18.7% borrowed for agricultural/business purposes. This means that a large percentage of farmers borrowed from informal sources and that a large percentage of money borrowed is not for production purposes but for consumption- or income-smoothening, health, or other purposes.[7]

[7] Country-level studies reported in this book support this observation.

Figure 9.4: Borrowing by Farmers in Developing Countries, 2017

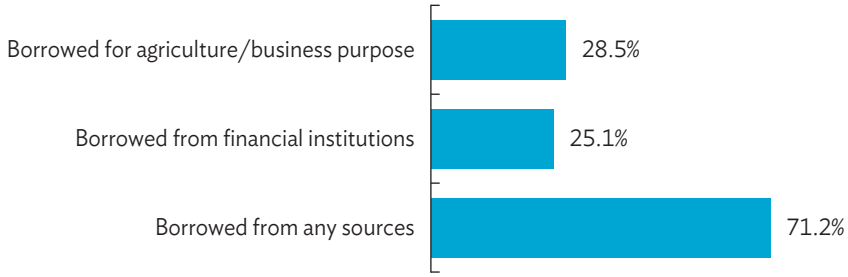


Source: World Bank Global Financial Inclusion database, 2017 (Demirguc-Kunt et al. 2018).

That is, improved financial inclusion made possible via mobile financial access did not increase borrowing in countries with higher penetration of mobile technology. For example, in Kenya, with its much higher financial access because of mobile penetration, 71.2% of the farmers borrowed from any source in 2017, while only 25.1% borrowed from financial institutions (banks and MFIs), and 28.5% borrowed for agricultural/business purposes (Figure 9.5). This is evident in all countries. In 2021, while 59.8% of mobile-only account holders borrowed from any source, only 5.3% borrowed from institutional sources (Figure 9.6). This suggests that having mobile financial accounts did not help farmers much to access institutional finance. This is also evident in Bangladesh, which has one of the highest rates of mobile account connections in the world; that is, rural households with a mobile connection do not necessarily have increased access to institutional finance, although it increases their financial inclusion rate (ADB 2022).

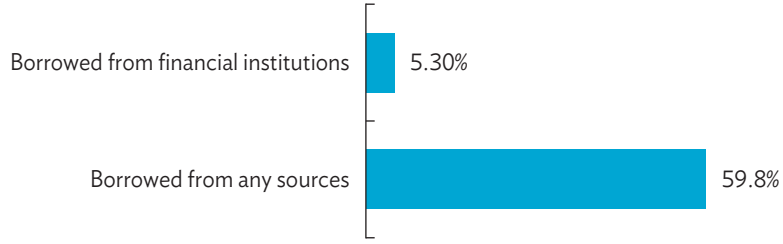
There are many actors behind the MFS expansion among farmers in SSA. For example, the whole value chain of TruTrade Africa, a social organization acting as a crop aggregator in Kenya and Uganda, has been totally digitalized, again because of higher rates of mobile connection. Farmers deliver their food to the pickup stations, where representatives from TruTrade Africa inspect it for quality, weigh it, and make a purchase offer. The agent initiates a payment to the farmer's mobile money account if the offer is accepted (GSMA 2022).

Figure 9.5: Borrowing by Farmers in Kenya, 2017



Source: World Bank Global Financial Inclusion database, 2017 (Demirguc-Kunt et al. 2018).

Figure 9.6: Borrowing by Mobile-Only Account Holders, 2021



Source: World Bank Global Financial Inclusion database, 2021 (Demirguc-Kunt et al. 2022).

Another example is Safaricom's DigiFarm platform in Kenya, which leverages the reach of M-PESA, a mobile phone-based money service, to provide farmers access to a comprehensive solution via a mobile phone. The platform gives users access to value-added services including soil analysis, insurance, and financial products as well as advisory services, inputs, and purchasers (GSMA 2022; IFC 2022).[8]

[8] Mobile technology can also help the insurance system. Three major barriers in the agricultural insurance markets are (i) lack of appropriate index insurance products, (ii) low take-up of insurance among farmers, and (iii) problem of collecting premiums and making payouts. However, both farmers and insurers can take advantage of the outreach of mobile phone and mobile banking technologies. For example, the ACRE Africa enterprise in East Africa allows farmers to pay insurance premiums and receive payouts via the M-PESA mobile banking system (Hess and Hazell 2016).

Table A9.1 presents a number of ongoing experiments in different countries that are providing various services (including credit and savings) to farmers or agribusinesses via mobile transactions. However, most of the experiments are based in SSA countries where access to institutional finance is very limited due to the high transaction costs of banking expansion. No wonder we notice a large expansion of MFS coverage in SSA countries. These experimental digital agri-based financial services use different ecosystems such as agent banking, partnership of financial systems with mobile networks, and digital tools such as credit scoring algorithms to extend a variety of financial services, including credit.

9.5 What Policies and Infrastructures Are Necessary to Expand Digital Outreach to Farmers?

Despite its inability to raise access to institutional finance, the use of a mobile money account has a significant impact on improving input utilization and farm output, which suggests that policies promoting the adoption of the technology should be supported.[9] For instance, increasing the number of mobile technology networks and mobile money service locations accelerates technology adoption, particularly in rural areas. Increased education spending and opening of financing options to smallholders can also help promote the uptake of mobile money technologies (Abdul-Rahaman and Awudu 2022).

There is a prima facie reason for expanding the coverage of mobile financial services for rural households, including smallholders. As mentioned, improved financial access to farmers can be ensured via mobile technology transfer even if it does not ensure farmers' access to institutional credit. Investment in the foundational components necessary for creating digital financial services, such as expanding digital identification and mobile broadband infrastructures, especially in distant locations, is urgently needed. To ensure a competitive ecosystem and enable the majority of people to make use of digital financial services, these investments should be supplemented with the necessary legal and regulatory frameworks (Pazarbasioglu et al. 2020).

[9] That is, even if farmers' access to institutional finance (credit for example) has not improved, mobile financial services help improve farmers' access to outside resources, such as remittances from relatives or transfers from the government, that help achieve efficiency in consumption as well as production (Murshid et al. 2020; ADB 2022; Jack and Suri 2014).

The policy foundations for digital expansion can be divided into three clusters: (i) developing a conducive legal and regulatory framework; (ii) enabling financial and digital infrastructures (such as payment systems, credit infrastructure, and digital connectivity infrastructure); and (iii) ensuring ancillary government support systems (for example, data platforms, digital identification and financial management platforms) (Pazarbasioglu et al. 2020).

A country's ICT network and power grid are both essential parts of the digital financial infrastructure. Basic DFS require reliable access to mobile services (e.g., M-PESA in Kenya and bKash in Bangladesh). By delivering DFS via apps, access to data services (3G and higher) can enhance the user experience of mobile technology (Alipay in the People's Republic of China and Paytm in India).

Providing access to mobile signals might not be sufficient on its own. A study by Naito and Yamamoto (2022) examined the effects of network accessibility on the use of mobile money in six developing countries (Bangladesh, Kenya, Nigeria, Pakistan, Tanzania, and Uganda) and discovered that network access is strongly connected with the use of mobile money in Pakistan and Tanzania only. In those two nations, the likelihood of utilizing mobile money rises by 10% for every additional 10 kilometers closer that a household gets to the area served by several mobile networks. This shows that expanding network accessibility might not be an efficient way to boost the use of mobile money transactions in some nations.

Reluctance to embrace digital money might be one of the reasons for a lack of mobile monetary transactions. In the GSMA's report on the state of the mobile money industry (GSMA 2022), preference for cash was identified as the most prevalent barrier to having a mobile money account. For a variety of factors relating to established practice, widespread acceptability, trust, and reliability either as a form of currency or a method of payment, farmers continue to utilize cash even when digital payment options are available (World Bank 2018). Users with less experience in digital technology feel more secure because of the physicality of cash. In fact, a combination of institutional and human factors strongly contribute to the exclusion of rural residents from digital banking. Most rural residents keep their hard-earned money at home due to the strong word-of-mouth syndrome caused by security worries related to online banking, hacking, and other types of negative news at the individual and community level (Agwu 2020).

DFS must be constructed in a way that is clear and pertinent to the intended users, represent local, contextually determined needs, and be made available through a channel that is both accessible and inexpensive (World Bank 2018). These solutions may inspire confidence in users, especially those with little prior experience using digital technology and financial services.

Another conducive policy is expansion of digital literacy, which the Alliance for Financial Inclusion (AFI) defines as "acquiring the knowledge, skills, confidence and competencies to safely use digitally delivered financial products and services, to make informed financial decisions and act in one's best financial interest per individual's economic and social circumstance" (AFI 2021: 5). The findings from South Asian and sub-Saharan African countries consistently show that both financial and digital literacy are key factors in building inclusiveness and financial resilience (e.g., savings, borrowing, and risk management) (Kass-Hanna, Lyons, and Liu 2022). The findings highlight the necessity of expanding traditional financial literacy to encompass digital literacy.

Finally, larger injections of credit and lending fund come with a wider risk for the financial system if DFS result in a scenario where financing is aggressively pursued and offered but not properly monitored and supervised (World Bank 2018). Rural market groups may not be prepared to assess the risks of adopting particular services, notably financing, given low levels of formal education, financial literacy, and digital literacy. Business development teams might view risk awareness and mitigation as a barrier to successfully promoting their products, and thus, may need a counterweight from teams who are good at recognizing and managing operational risk (World Bank 2018). This should ensure a check and balance in the digital system.

9.6 What Can Donors and Other Stakeholders Do for Digitalizing Agricultural Finance?

Of all the stakeholders in the digital ecosystem, the viewpoint of poor communities, especially smallholders, is frequently underrepresented (USAID 2014). However, considering their mission, donors can use their position to ensure that smallholders' viewpoint is considered while expanding DFS coverage to reach smallholders and agribusiness communities, who are used to cash-based transactions. For instance, they could promote easing of customer

identification requirements or offer financial incentives to serve providers so they will extend their outreach to underprivileged and poor communities. Donors are also not primarily motivated by thoughts of immediate financial success. This encourages experimentation and creativity and enables donors to plan initiatives with results that prioritize lessons learned. Donors can fund "public good" research that may be broadly distributed and benefit the ecosystem as a whole (USAID 2014).

Multiple businesses or organizations are frequently involved in DFS offerings for agriculture. It is beneficial to cooperate and take advantage of strengths of digital providers, including knowledge of financial services. It is also worth supporting the penetration of mobile network service delivery channels, the usability of mobile technology products, and supply chain networks of agribusinesses for the distribution of inputs or collection of outputs in rural areas. The roles of proximity, trust, and knowledge of community-based organizations to rural populations are very important for outreach of DFS in rural areas (World Bank 2018).

Additionally, there are numerous new players who are not conventional banks. For instance, fintech is providing solutions to new consumer segments, such as small and medium-sized enterprises (SMEs), that meet demands that banks have never catered to (World Bank 2018). Because new entities (FinTech and Mobile Network Operators) have joined the market and taken on significant and valuable roles, partnerships are required in this area. They are increasing their market share and momentum. As a result, knowledge and abilities that are acquired, when applied correctly, can be essential (World Bank 2018). It makes sense to collaborate with experts because the capabilities and requirements of new technologies change quickly. Working with low-income agricultural clientele requires partnerships as well. These populations continue to receive inadequate care because dealing with them comes with a number of difficulties. Understanding and serving this sector can be made commercially feasible by working with partners such as mobile networks that traditional financial institutions may not generally collaborate with (World Bank 2018).

Despite government and donor support, smallholders have very limited access to institutional financial services, including credit and savings in the developing world, for a variety of reasons. Factors such as weather uncertainty and seasonality cause farming to be a risky venture for any type of financial institution to deal with.

Proximity to physical banks and other financial institutions is another barrier. Mobile finance can help address proximity issues but not necessarily weather uncertainty. Addressing climate change and weather uncertainty is a serious bottleneck for any financial system to deal with. It is necessary for a collaborative mechanism of several institutions to deal with natural calamities.

Lack of land entitlement or registration is one deterring factor for banks to lend to farmers. Due to lack of adequate information, financial institutions often find it difficult to assess risk in farm lending. MFIs often use social network arrangements, such as group responsibility, to address such issues. In the past, governments tried to circumvent such problems through government-aided national bank systems such as the National Bank for Agriculture and Rural Development in India, the Bank for Agriculture and Agricultural Cooperatives in Thailand, and Bank Rakyat Indonesia in Indonesia. Some of these programs succeeded with continued government and donor support, but many failed because of lack of innovation in the financial ecosystem. No wonder MFIs have increasingly been supporting farming communities using social network or self-help groups in the developing world, where joint social responsibility affects individual liability. Cross-country data analysis shows that institutional credit accessed by farmers actually comes largely from a country's burgeoning microfinance system (Khandker 2021).

Hence, digitalization of financial services for farmers means digitalization of microfinance in many countries of Asia and SSA. Donors can help develop support schemes that promote digitalization of microfinance or commercial banks' finance or cooperative and self-help group finance who intend to reach out to farmers and agribusinesses more efficiently and inclusively. Note that digitalization of microfinance (including cooperative and self-help group finance) often cannot handle a variety of demands for financial services for a particular group and thus, needs partnership with commercial banks that have much liquidity and a large network both in urban centers and peri-urban locales. Governments and other stakeholders can help facilitate such partnerships with the objective of digitalizing an ecosystem of agricultural financial services.

9.7 Digitalizing Microfinance: A Test Case for Determining the Extent of Digital Financial Services Offered to Smallholders

Mobile technology has the potential to enhance the efficiency of microcredit and savings services of MFIs for poor people (especially women and smallholders) as well as services of cooperatives and self-help groups of farmers. By integrating mobile technology into financial transactions, MFIs, which practice social collateral-based banking such as group-based programs in Bangladesh and elsewhere to support the income-earning activities of poor people, in principle can save time and money in loan disbursement and collection, cash management, document processing, and verification of potential clients. Consequently, branch operations and staff activities of branch-based MFIs that use DFS are likely to be more efficient. Much of the cost savings can be transferred to clients, with the likelihood of interest rates being decreased. Thus, digitalization of microfinance operations can present a win-win scenario for the providers and the clients alike.[10]

Because of the observed benefits as well as outreach of microfinance programs, especially in reaching women and smallholders, reducing the cost of borrowing from MFIs is a policy issue that deserves serious attention. Without much innovation for some time, MFIs still carry out operations the traditional way, and as a result, cost optimization has become an issue with growing outreach. Moreover, while the demand for loans has grown, growth in the number of borrowers has not been proportionate or remains stagnated. One way to reduce the cost of operation for an MFI system is to digitalize its operation, especially its lending and mobilizing savings, and extend such services not only to farmers but to an array of other participants in the agricultural value chain.

In recent years, commercial banks and fintech companies are trying to penetrate the uncharted financial landscape focusing on the low-income and rural segment of the market. More specifically, agent banking operations of the commercial banks offer loans to rural and unbanked populations at interest rates similar to those charged by retail banks—much lower than the rates charged by MFIs.

[10] This is also true for registered cooperatives specialized in microlending and mobilizing micro-savings.

In this changing landscape, MFIs may have to use digitalization to innovate with their services in order to remain competitive and sustainable as well as affordable and reachable to poor people, especially women.

In Bangladesh, for example, the process of digitalization of microfinance has just started at a limited (pilot) scale, mostly by MFIs such as BRAC and BURO Bangladesh. These programs use MFS such as bKash (directly from the client or through an agent) to disburse loans and collect loan payments, but lending decisions are taken using branch-level operations. Agent banking mechanisms have also been introduced by some commercial banks, such as Dutch-Bangla Bank and City Bank, which target the rural customers. But data shows that agent banking is engaged much more in savings mobilization than in lending—only 12% of what they mobilized as savings is actually disbursed as loans, but the lending decision is taken by commercial bank branches, not the agents.

Digitalization of microfinance (essentially credit and savings programs) does not address, at least by definition, the group dynamics of microcredit operations—group collateral (peer monitoring) to enforce loan repayments or reduce the costs of asymmetric information associated with lending (so-called adverse selection). So, without resolving such issues, simply extending digital technology to carry out microloan transactions may not resolve the issue of the social collateral mechanism, the foundation of the group-based lending services. For example, if digitalization of group-based financial services is introduced without taking into account the adverse selection bias, it is not clear if such digitalization of group-based lending and savings as practiced by MFIs would be sustainable or interoperable. If we contrast this type of group-based lending program with M-Shwari's lending programs in Kenya and other African countries, it is clear that M-Shwari introduced individual-based lending that provides very small loans to individuals for a very short period (a month) at a very high interest rates (7.5% per month or 90% per annum). Such lending is good for meeting emergency needs but not for supporting income-earning activities, which require larger loan amounts at a lower rate after a longer period. M-Shwari is an individual-based lending operation where borrower selection is done digitally via machine learning or other scoring algorithms via an individual's mobile phone subscription to M-PESA.

A study has been carried out in the Philippines to evaluate if a group-based savings program is efficient when mobile phone technology is connected to mobilize savings instead of groups mobilizing savings (Harigaya 2020).

Findings of this study are striking: savings decreased by 20% and reliance on informal borrowing increased among the members of groups who were offered mobile banking with fewer restrictions on group cohesion. Does this mean group-based banking cannot be digitalized? Developing digitalization of group-based lending with savings mobilization (as practiced in the traditional microfinance system) has therefore remained a challenge.

To determine if it is possible to digitalize group-based microcredit and savings programs, some experimentation is perhaps worth undertaking. The idea may be to combine individual credit scoring with credit scoring of groups responsible for reducing adverse selection bias for lending. This may be a way to test out how a group-based lending program such as that of Grameen Bank or BRAC in Bangladesh and elsewhere may be digitalized where groups still support peer monitoring but lending is carried out digitally to address individuals' needs. Support from government, stakeholders, and development partners would be critical in helping to develop and experiment with digitalization of alternative designs (such as group-based microcredit programs as well as individual-based lending programs) of commercial banks and MFIs that can be geared toward reaching farmers, especially smallholders, and small businesses involved in agribusinesses through digital means.

9.8 Conclusion

Over the last decade, digital financial services (DFS) have expanded coverage using a variety of technologies including mobile technology. In particular, with the expansion of mobile phone technology in remote rural areas of Asia and Africa, financial services such as payments and remittances have been reaching smallholders and small agribusinesses in an unprecedented way. However, digitalized financial services, mainly in the form of mobile financial services (MFS), have not been able to extend other services such as credit disbursements to and savings mobilization from these disadvantaged groups located in remote communities that remain outside the physical network of commercial banks and other entities. Other groups such as MFIs and cooperatives have been active in reaching some of these smallholders and agribusinesses in small ways with lending and mobilizing savings services, albeit at a higher transaction cost for both service providers and customers.

So, there is a dichotomy in the delivery of financial services by the existing financial institutions for two groups of clientele. While large farmers have access to commercial banks, smallholders generally lack access to them but have limited access to MFIs and self-help groups such as cooperatives. On the other hand, mobile financial services provide limited services such as payments and remittance transfers to groups of households and communities, but the digital technology has not been utilized to modernize the other financial services such as lending and mobilizing savings or insuring against uncertainty. Such a dualism in both DFS and non-digital physical financial services is a major barrier to transforming subsistence agriculture into commercial agriculture that can ensure higher productivity and higher food security via promoting high-value food production and associated supply chains.

This chapter discusses the lessons learned from the SSA region's agriculture, which has experienced a large expansion of financial inclusion in many of its countries such as Kenya and Uganda because of high penetration of mobile technology. However, data analysis shows that financial inclusion (simply having account with a bank, MFI, or MFS) does not mean farmers have the desired access to financial services such as institutional credit for promoting private investment to commercialize subsistence agriculture. While institutional credit is absolutely necessary to support agricultural investment, commercial banks cannot meet smallholders' needs because of their design favoring large volumes of lending, and MFIs and cooperatives cannot cover the needs because of their disbursement of small loan amounts to groups of households. Hence, commercializing subsistence agriculture via large investment financed through institutional credit can be done by promoting linkages between commercial banking and small-scale cooperatives and MFIs. This linkage can be made possible via digitalization of the existing financial system through integration of these two systems.

In order to strengthen the DFS to include other financial services such as credit disbursement, experimentation is perhaps necessary to merge MFS with MFIs/cooperatives as well as with commercial banking. Some form of experimentation for promoting an integration of three parallel financial systems (commercial banking, micro-banking, and mobile banking) is going on in some countries such as Kenya and Bangladesh. Donors and governments must encourage such integration in an appropriate manner that is conducive to the integration of a digitalized financial system to commercialize subsistence agriculture for attaining sustainable growth and food security. Of course, digitalization of agricultural finance must be encouraged by incorporating alternative stakeholders active in the financial ecosystem.

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Table A9.1: Recent Examples of Digital Finance Targeted to Agriculture

Tigo Rwanda

Mobile network provider working in Rwanda

Description

Tigo Money Rwanda is a mobile money service that provides Tigo mobile subscribers with an e-wallet account, which enables access to a variety of financial services including payments, savings, credit, and other services.

Implementation

Tigo integrated with three savings and credit cooperative organizations, enabling farmers to draw funds into their Tigo wallets through a "bank-to-wallet" or "push-pull" mechanism.

In order to onboard the cooperatives to a core banking software, Tigo and the Wood Foundation sought the support of Access to Finance Rwanda, part of the UK Aid-funded Financial Sector Deepening for Africa initiative, to help facilitate procurement of an appropriate solution.

Tigo decided to procure handsets at a wholesale price and distribute them to cooperatives as an advance. The cooperatives then act as the sales agent for the handsets while also providing a payment plan that farmers can choose instead of paying the purchase price up front.

myAgro

Third-party digital platform provider working in Senegal, Mali, Tanzania

Description

myAgro is a nonprofit social enterprise with primary operations in Senegal and Mali. It offers smallholder farmers a way to make small payments over time that add up to the cost of a high-quality inputs package. As a layaway payments platform, myAgro provides farmers with agro-information and advice, a way to pay incrementally for input packages using scratch cards or mobile devices, and coordination of input package delivery.

Implementation

Farmers register through myAgro agents with smartphones that operate the myAgro mobile application. These field agents are typically part of the local community, which helps build trust and communication. Field agents that help enroll farmers also offer periodic agricultural trainings. They collect farmer names, gender, village, and input choices. The myAgro platform issues a unique identification number to track layaway payments back to individual farmers. As it is not a financial institution and does not provide any formal deposit-taking or lending services that accrue interest, myAgro does not require a formal government ID for registration.

Bank Asia

Commercial bank working in Bangladesh

Description

Bank Asia adopts a holistic approach to lending and payments whereby farmers and other agro-value chain actors can transact digitally in person (e.g., at a rural collection point such as a cooperative) or remotely via mobile device or rural banking agents. Agents offer deposits, withdrawals, savings, payments, money transfers, credit, lending, and insurance.

Implementation

Bank Asia currently has about 2,350 registered agents. A majority of these agents currently operate at local municipal centers of the government, but a growing percentage are for-profit entities or NGOs providing microfinance services to specific rural regions. Based on a blended commission structure that draws from float interest and per transaction revenues, agents have thus far demonstrated a motivation to mobilize and effectively safeguard deposits as opposed to simply drive account activation without emphasizing product comprehension and usage.

continued on next page

Table A9.1: ***Continued***

Apollo Agriculture
Third-party digital platform provider working in Kenya

Description
Apollo Agriculture is a digital lending platform that provides farmers with access to credit based on an alternative scoring method, as well as agro-information and advice services. Apollo has chosen to target smallholder farmers who work in less organized value chains because they are the largest segment of commercially active farmers in the country.

Implementation
Customer acquisition takes place through radio, refer-a-friend incentive programs, and road shows. Once customers are registered (typically through a low-cost SMS channel) they engage with Apollo through the call center for enrollment and are visited by agents who conduct the data collection. Apollo agents then use smartphones to capture the GPS boundaries of customers' farms and record additional observations about the applicant that complement satellite imagery used to assess farmers' yield, crop cycles, crop types, housing, animal/livestock ownership, and access to roads. Apollo then takes these different data sources to help tailor both information services and creditworthiness scoring. Farmers repay their Apollo loans through mobile money gradually over the course of the season, with full payment due after harvest. Farmers also receive agronomic advice from Apollo through SMS and automated voice calls in multiple languages.

Tulaa
Third-party digital platform provider working in Ghana and Kenya

Description
Tulaa is a digital lending platform that links input suppliers, farmers, and commodity off-takers. It also provides financing to farmers for agro-input purchases and coordinates their delivery through existing retail networks or paid field agents.

Implementation
Tulaa alters the role of the farmer in collection or repayment activity related to lending or crop selling. Loans are disbursed directly from the lender to the input supplier over the Tulaa platform. Loan repayment is made by the output buyers in lieu of paying the farmer directly. The remaining balance is owed to the farmer, who receives this payment to a mobile money account.

Tulaa uses digital channels at multiple levels—farmer, input supplier, commodity off-taker, and lender—to enhance and complement existing human networks working within targeted agro-value chains. During farmer registration, Tulaa staff collect KYC data, farmer crop data, and plot location data. Farmers also select their desired inputs packages and determine where and when they will collect them. In most cases (over 90%), farmers apply for a loan to cover the costs of the inputs package. When a loan is requested, the farmer is required to provide cash collateral to the lender, which can be either Tulaa directly or a lending partner such as the MFI Musoni in Kenya.

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Table A9.1: ***Continued***

Hello Tractor *Third-party digital platform provider working in Kenya, Mozambique, Nigeria, Senegal, South Africa, and Tanzania*
Description Hello Tractor provides business asset management services to compact tractor owners or fleet managers as well as a remote mobile app-based booking service for farmers to lease equipment through rural booking agents, which relies on GIS-based software and sensor equipment.
Implementation Farmers do not need to have a digital or mobile device to request a tractor, although this is rapidly evolving in some markets based on the geographic location of tractor demand and mobile technology access and usage of farmers. Currently, farmers need only to identify and contact a rural booking agent, who then assumes responsibility for ensuring that a compact tractor and tractor operator arrive as requested. The booking agent, in exchange for coordinating this service, is paid a commission of 10% on each job completed. Farmers that have mobile devices can also access a USSD short code to connect with a booking agent remotely. Virtually all farmers currently pay for this service in cash. Payment is made on the same day the tractor arrives, and two fees comprise the total amount. The farmer pays one fee to the rural booking agent and another to the tractor operator.

GIS = geographic information system, GPS = global positioning system, KYC = know your customer, MFI = microfinance institution, NGO = nongovernment organization, USSD = unstructured supplementary service data.

Source: IFC (2022).

CHAPTER 10

Strengthening Access and Efficiency of Agricultural Finance

Shahidur R. Khandker and Takashi Yamano

The stylized facts about agricultural finance based on the latest cross-country analysis of the Global Financial Inclusion (Findex) data are the following: Agricultural productivity is strongly associated with financial inclusion in agriculture. Financial inclusion is higher in the developed regions such as Latin America and the Caribbean (LAC) and lower in the least-developed regions such as the Middle East and North Africa (MENA). Developing countries in Asia fall in the middle. The demand for and use of financial services provided by banks (commercial and agricultural development banks) is the highest among rich and educated households, with the highest access to resources from microfinance institutions (MFIs) and cooperatives being among the poorer farm households. Branchless banking with mobile technology is more prominent in difficult-to-reach areas of all developing areas, especially in sub-Saharan Africa (SSA). This pattern of financial services through banks and MFIs/cooperatives has been consistent across regions: Banks serve rich farm households and MFIs/cooperatives serve relatively poor farm households. In contrast, mobile financial services (MFS) provide mostly cash transfers/remittances and payments, but not much credit and savings. MFS do not differentiate between boundaries across urban and rural areas nor the people based on wealth and occupation.

Several country-level in-depth data analyses from Asia show that perspectives of agricultural finance differ substantially across countries. Financial inclusion among farmers is the highest in Thailand (99.7%) and lowest in Viet Nam (49.0%). India and Bangladesh are somewhere in between—financial inclusion among farmers is 88.0% in India and 69.7% in Bangladesh. There is substantial difference in the farmers' borrowing status across those four Asian countries. For example, in 2017, some 63% of farmers borrowed in India, Thailand, and Viet Nam, followed by 52% in Bangladesh. However, farmers' demand for credit from financial institutions such as banks and MFIs/cooperatives is highest in Viet Nam (35%), followed by Thailand (29%), Bangladesh (18%), and India (10%).

This clearly shows that the majority of farmers in India rely more on informal sources than their counterparts in Bangladesh, Thailand, and Viet Nam.

Interestingly, government-run banks play a vital role in extending credit to farmers in Thailand, while such banks have failed to deliver those services in Bangladesh and India. However, MFIs have been able to deliver credit to farmers in Bangladesh and Viet Nam. The MFIs in those countries play a vital role to support agriculture, unlike in other countries in the region. Also, mobile financial services play an important role in extending financial services such as payments and remittance transfers in Bangladesh much more than in India, Thailand, and Viet Nam. No wonder having a mobile financial services account is a major factor in ensuring higher financial inclusion in Bangladesh while having a bank account is the main source in India, Thailand, and Viet Nam.

Regional in-depth data analysis from LAC and SSA portray not so different perspectives of agricultural finance. LAC is a net exporter of food compared to SSA, which is a net food importer. While 90% of land in SSA is cultivated by subsistence farmers, some 50% of land in LAC is cultivated by commercial farming. Access to institutional finance among farmers is higher in LAC than in SSA, and incidence of mobile finance, mostly in terms of providing payments and remittances, is higher in SSA than in LAC. In a way, the case in LAC resembles that in Thailand, while the case in SSA resembles that in Bangladesh. Nonetheless, in all three regions, smallholders in agriculture have very limited access to agricultural finance to promote investment in farming and, hence, productivity and food security.

Household-level data analysis demonstrates that the use of financial services (e.g., credit) is higher among smallholders than among rich landowners, confirming the fact that smallholders are more credit-constrained than rich farmers. This is true in almost all countries and all regions. Data analysis also demonstrates that credit has a significant positive effect on crops and other categories of farm and nonfarm income; it also helps increase consumption, education, and health through enhanced income. Finance enhances resilience among households via resolving seasonal cash flows and variations of agricultural income.

Many governments in developing countries emphasize understandably the need to increase agricultural productivity, especially in smallholder agriculture, in order to develop agriculture sustainably and attain food security. This policymaking for ensuring farmers' access to reliable financial services has become a more prominent issue since the onset of the coronavirus disease (COVID-19) pandemic and the start of Russia's war in Ukraine, and these events have significantly affected supply chains. More importantly, agriculture finance is a critical component of policymaking in many developing countries, where agricultural growth drives overall growth but where agriculture is managed largely by smallholders, who cultivate more than three-fourths of land in the developing world.

Agriculture is in general subject to varying covariate risk. On top of that, farmers face idiosyncratic shocks, a binding constraint for any farm-level decision making. While large farmers are rich and have better access to institutional finance to mitigate those risks, smallholders—for a variety of reasons—are constrained in their financial environment. Many do not have access to efficient financial services to save, borrow, pay, and insure against risks due to both demand and supply constraints. This limited access is in part due to the high transaction costs of small loans and savings, as well as the high risk associated with farming caused by unpredictable droughts and excessive rains. The goal of any government decision making, therefore, is to help develop and sustain an appropriate financial ecosystem and policies in support of enhanced financial development for agriculture and innovations for appropriate product and institutional development.

For sure, financial development for agriculture needs to embrace innovation and technology, including the development of cost-effective products, services, market access, and institutions to offer appropriate financial services, including digital financial services, to meet the needs of farmers. For example, technologies, such as branchless mobile banking, provide new ways to conduct business with small farmers and businesses who are often neglected in the current landscape of the financial system.

Countries' financial development strategies must be based on two pillars of success: (i) lowering transaction costs for expanding financial services that design savings, credit, payments, and insurance products for smallholders and businesses and (ii) linking the sustainability of the agricultural financial system to sustainable agricultural growth. These twin pillars of success must be the

guiding principles for agricultural financial support policies of developing country governments, as well as for those of the World Bank and other multilateral and bilateral donors and agencies helping governments in the developing world.

In any case, both donors and government policies must support and promote innovations in agricultural finance. Donors and governments, departing from their past misdirected policies of direct intervention in agricultural credit markets, may be providing lines of credit to financial institutions to extend credit, insurance, and other services. Examples of recent World Bank-supported credit access programs include the Rural Finance Project in Viet Nam, the SAGARPA program in Mexico, and the Financial Services for the Poorest project in Bangladesh. Commercial bank lending has increased in recent years to support agriculture. Governments are not directly subsidizing banks' lending but are increasing resources to extend bank loans and other services targeted to the smallholders and small agribusinesses. Donors may also support programs to upgrade the technology of local financial institutions to deliver digital financial services and also training in developing countries (e.g., Strengthening India's Rural Credit Cooperatives Project). Commercial bank lending to agriculture has somewhat improved in recent years for such initiatives.

Similarly, donors are providing support to expand coverage of MFIs in extending credit to farmers. MFIs in developing countries have no doubt made some headway in reaching small and marginal farmers with finance of donors to resolve supply-side credit constraints. However, MFIs have limited capacity to extend farm lending because they typically lack the required licenses to operate as a bank like Grameen Bank in Bangladesh, which can mobilize savings. Also, many of these microfinance institutions are unable to offer a wide array of financial products to suit the needs of farmers and small producers. As a result, MFIs have tended to operate on a small scale, offering local, demand-driven options, such as group liability for short-term lending, to better reach clients and improve their own profitability and sustainability.

Yet with support from donors and governments, microfinance lending is increasingly supporting agriculture, in part extending seasonal credit, sometimes with funds of commercial banks to satisfy their government-set target to reach farmers in their loan portfolio. In order to promote these MFIs as micro-banks, they should be regulated to mobilize savings from and extend insurance to farmers so as to become self-sustainable banks in support of agriculture finance. Converting some of the MFIs into banks should be a well-recognized policy.

In this case, the recent example of the World Bank's support in India is worth following. The World Bank financed a nongovernment microfinance facility, called Bandhan, to become a rural bank to support rural finance, including agricultural finance (World Bank 2015).

Mobile financial services (MFS) are the latest innovative way of extending financial services to agriculture. While banks and MFIs need physical infrastructure to extend financial services to rural areas, MFS have no such barrier. However, availability of MFS varies substantially—while 88% of financial accounts were facilitated by mobile networks in Uganda as of 2017, MFS were nonexistent in Ethiopia. On the other hand, 100% of financial inclusion in Ethiopia was facilitated by banks and MFIs, compared to only 58% in Uganda. A branch network is an effective way of reaching farmers in more developed agricultural economies such as Thailand. In Thailand as of 2017, 91% of individuals in agriculture had an account with a financial institution such as a bank or MFI, and only 5.7% of financial accounts were facilitated via mobile financial services.

A mobile financial account provides financial services such as payments and transfer of remittances, but it is not yet capable of extending credit or mobilizing savings. In 2017 in Uganda, for example, while financial inclusion is high (65.5%), facilitated mostly by mobile phone networks, the extent of borrowing from financial institutions to support agriculture is only 16.4%.

Financial inclusion via mobile financial services is nonetheless worth supporting. Mobile finance can reduce reliance on cash transactions and can save time for those living in more geographically isolated areas with less access to transport, financial institutions, and infrastructure. In Kenya, Uganda, and other countries, mobile money accounts are increasingly being developed to link farmers, agents, and buyers. Mobile-based financial services are emerging to draw a greater share of the population into formal financial services (not necessarily for borrowing but for payment services and remitting money), particularly in SSA and other regions. Therefore, innovations promoting linkages of mobile financial services with agricultural finance may be facilitated by the government and donors to promote digitation in agri-finance.

Agricultural financial institutions including MFS must learn how to serve small farmers as per demand and deliver products profitably to resolve both

short-term cash flow problems and long-term investment needs of smallholders. Institutions must also be developed to address idiosyncratic and systematic risks that characterize agriculture in a highly volatile agroclimatic environment. Government and donor policies must facilitate rather than dictate institutional finance to enhance agricultural investment.

Governments can help develop alternative institutions with appropriate incentive structures for promoting agricultural finance; a combination of bank finance, microfinance, and mobile finance is necessary for agricultural finance. One group of finance does not fit the needs of each and every farmer and other stakeholder involved in agriculture.

This means governments may support innovations that encourage the facilitating role of financial institutions in enhancing smallholders' access to finance. First, governments need to provide a sound macroeconomic and regulatory framework, establish a prudent monitoring framework through central banks to protect savers, and fund innovations in financial product design and diversification via experimentation. Second, learning from MFIs and informal finance, agricultural finance can utilize social collateral to mitigate risk, and this should be part of the innovation in agricultural finance. Third, institutional innovation may promote linkages between formal financial institutions and MFIs, rotating savings and credit associations (ROSCAs), and village banks. Above all, government support should be directed toward lowering transaction cost for the marginal farmers and smallholders to access financial services. This is probably the way for any government to support agricultural finance that can be financially viable as well as effective in promoting agricultural development via transforming the traditional agriculture (which is largely based on own finance and produces for self-consumption).

Another lesson worth noting is that governments and policymakers have paid significantly more attention to providing credit than to providing other types of finance, such as savings, payments, and insurance. In addition, misguided government debt-waiving and subsidized interest rate policies to expand credit are often captured by the elites in the rural system, depriving small and marginal farmers who most need access to financial services to enhance their agricultural investment and productivity.

Yet another lesson learned from this book's studies is that both governments and donors that want to support developing agriculture need to better understand the constraints faced by smaller farmers, as well as those faced by institutional lenders active in rural areas, so as to help these stakeholders target and utilize financial services effectively. Institutional lenders must figure out how to reduce the high transaction costs associated with appraising rural borrowers, as well as with monitoring and collecting rural loans.

Policymakers also need to strike the right balance between different types of financial instruments (credit, savings, payments, and insurance) for smallholders using alternative forms of financial systems combining both digital (e.g., mobile money and agent banking) and non-digital (banks, MFIs, and cooperatives) financial services. The system must utilize the information and communications technology (ICT) already available in the country or region and all stakeholders (governments, regulators, and financial providers) involved in developing and delivering the appropriate services in the most cost-effective ways for both providers and customers.

It must be recognized at the outset that one type of finance may not fit all. For example, smallholders have diverse needs to cope with agroclimatic risk affecting agricultural activities. Some farmers may need more non-credit financial services, such as savings, payments, or insurance, than credit itself. Non-credit financial services may not be more effective than credit in raising farm productivity in the short run, but they may bolster credit demand and credit utilization in smallholders in the long run. Reducing the transaction costs associated with lending by institutional lenders may involve facilitating credit through other local institutions, such as nongovernment organizations, self-help groups, and input dealers, with which farmers are already associated (Golait 2007). In addition, considering complementary initiatives—such as weather insurance and agricultural extension services—to help foster better monitoring of local agricultural conditions would help institutions to develop better lending products, thus improving smaller farmers' ability to respond to rainfall and price fluctuations.

Technical assistance for smaller farmers is also an important policy instrument to ensure that agricultural finance is effective in raising agricultural investment and productivity, especially among small and marginal farmers. Similar nonfinancial services may be developed for other stakeholders associated with agro-processing, distributing, and other services of the value chain.

Finally, opportunities are often developed in piecemeal ways. The issue is how to disentangle the system so as to make it more productive and accessible across the agents involved in the agricultural value chain, including smallholder farmers. In this sense, coordinated efforts of all stakeholders, including international development agencies such as the Asian Development Bank and World Bank, are essential for realizing the benefits of emerging opportunities in the financial ecosystem. It is time to evaluate whether the current system of institutional support through the World Bank and other agencies involved in agricultural finance is effective enough to meet the challenges of this century's global food insecurity and climate change issues. It is also worth considering if it is necessary to establish an International Agri-Bank (IAB) to coordinate the emerging opportunities, including digitizing agricultural financial services and their access and efficiency, with the emerging needs of the value chain agents of the challenging system of agricultural production, technology, and distribution.

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Agricultural Finance in Developing Countries
Challenges and Opportunities

This book explores the critical role of finance in transforming agriculture and fostering sustainable development in developing countries. Its themes include the interplay between financial inclusion, agricultural productivity, and food security in the context of global challenges such as climate change and economic volatility.

Featuring case studies from across Asia, Latin America, and sub-Saharan Africa, the book highlights innovative solutions and policy frameworks that bridge the gap between farmers and financial institutions. It examines the effectiveness of tools such as microfinance, mobile financial services, and targeted agricultural development banks in enhancing access to credit, savings, payments, and insurance for rural households.

With rigorous analysis supported by household surveys and institutional data, the book sheds light on how tailored financial services can empower smallholders, mitigate risks, and drive agricultural transformation. The insights presented will be invaluable for policymakers, development practitioners, financial institutions, and researchers aiming to address structural barriers and unlock the potential of agriculture as a driver of economic growth and poverty reduction.

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