

# Segmentation of Smallholder Households: Meeting the Range of Financial Needs in Agricultural Families

There are an estimated 500 million smallholder farmers in low- and middle-income countries. And, despite some improvement in their access to general financial services, relatively little progress has been made in financial services specific to their agricultural activities.<sup>1</sup> Rural households and their demand for financial services have not been well understood, and the risk of extending them credit seems higher, due in part to the inherent risks of agriculture, the axis on which much of the rural economy turns. The relatively low population density of rural areas and the small size of most transactions have also made it very difficult to capture savings, channel remittances, build money transfer systems, and offer individual microinsurance products. Expanding the access of poor households to general financial services has already proven difficult. Meeting their additional needs for financial services related to agriculture seems even more daunting.

But opportunities in agricultural finance do exist, as demonstrated by positive experiences across a range of delivery channels, products, and financial service providers. Simple yet powerful innovations in the use of mobile phones, for example, are aggregating farmers and driving down transaction costs to levels that could pave the way for financial products and applications that had been previously unprofitable. Savings products have been modified to allow users to accumulate toward specific household goals in practical ways that fit with their cash flows and future spending needs. Financial service providers have learned a great deal about

how to manage microloans to poor families and get them repaid—profitably. Private-sector agricultural businesses have also been steadily expanding their role in financial services, embedding access to credit in the production chain within a bundle of other goods and services (e.g., seeds, inputs, weather information, insurance) to secure steady supplies of raw materials and higher-value crops.

This paper examines the challenge of providing financial services that support the multiple goals of rural households, including those related to their more universal, general household needs and those linked to their agricultural activities.<sup>2</sup> Following an overview of the policy and business case for attention to smallholders and their agricultural activities, this paper proposes a segmentation framework for the 500 million smallholders in low- and middle-income countries to more precisely characterize their demand for financial services related to agricultural activities. These three segments—(i) noncommercial smallholders, (ii) commercial smallholders in loose value chains, and (iii) commercial smallholders in tight value chains—are differentiated by what they grow, how they engage with markets as buyers and/or sellers, and how those markets are organized. These segments are not meant to be fixed, iron-clad divisions, but rather categories based on common traits that can begin to illuminate the financial mechanisms that might best fit the given financial goals and cash flows. This paper then outlines the demand for and current supply of financial services

1 The number of smallholder farms is estimated to be between 400 million and 500 million, and the number of people living in these households between 1.5 billion and 2.5 billion. See Conway (2012); Hazell (2011); Hazell, Poulton, Wiggins, and Dorward (2007); IFAD (2011c); Nagayets (2005); and World Bank (2007). See Box 1 on the terminology in this paper and Annex 1 on the calculation of the various population estimates in this paper.

2 The scope of this paper does not include how to increase agricultural productivity, promote higher-value crops, or even alleviate poverty. These are all important goals, but they are complex topics in which finance plays only a subordinate role.

within each segment, and it concludes with some initial ideas on opportunities to better meet their financial needs.

The results of this analysis emphasize that different kinds of households have different kinds of financial needs, and that this variety in demand cannot be met by the same suite of financial products, terms of service, or even formal financial service providers. Moreover general household finance and specific agricultural finance do not exist in isolation. Money is fungible, and many existing financial services can meet a range of household goals, including some related to agriculture. Financial service providers that are working to understand the entirety and variety of household

income flows could play an important role in meeting the demand for these general, widely applicable financial services from poor farming households. And value-chain finance approaches can make an important contribution, though for a limited range of crops and farmers, and focused largely on credit. Beyond what general financial services can offer, there seem to be relatively few additional—though important—instances in which new delivery channels, products, or business models may be needed to address the specific risks and cash flows of agriculture. More work is needed, however, to better understand the demand for and use of financial products in agricultural households, and how their total portfolio of financial services can be improved.

### Box 1. Terminology

Since this paper is intended for audiences working in both inclusive finance and agriculture, it may be useful to define a number of the key terms used throughout this analysis.

*Agriculture* and *farming* are used in this paper as general terms that encompass the wide variety of crop, livestock, and fisheries production, at whatever scale of production.

*Agricultural households* is intended in this paper as shorthand for that group of families in which agricultural activities represent a meaningful proportion of their total household income. Poor, farming households tend to earn income from a range of both agricultural and nonagricultural sources, and the relative significance of their agricultural activities in their total household income is highly variable (see Section 1b). Used here, *agricultural households* is meant to express the paper's objective of using financial services and products to support a range of agricultural activities, as well as the wide variety of other family goals for which formal financial services can be useful, while leaving aside the exact degree to which households may depend on agriculture for their income.

Defining the precise *poverty level* of households is similarly thorny. This analysis focuses on families in low- and middle-income countries that would generally be considered poor, by any reasonable definition (e.g., living on less than US\$2 a day, living under the poverty line, locally used definition).

Financial service providers are considered formal, semiformal, and informal. *Formal financial service*

*providers* such as banks are subject to general laws and regulations, as well as to specific banking regulations and supervision. *Semiformal providers* such as credit unions are registered entities subject to all relevant general laws, but not to bank regulation and supervision. *Informal providers* such as savings and credit associations are subject to neither commercial law nor special banking laws or regulations, meaning that disputes often cannot be resolved by turning to the legal system.<sup>a</sup>

A *value chain* is the series of steps and related actors that transform raw materials into finished products. *Value-chain finance* includes any or all of the financial services, products, and support services that flow to and/or through a value chain to address the needs and constraints of its participants in accessing finance, securing sales, procuring products, reducing risks, and/or improving efficiency (Miller and Jones 2010). These approaches include *inter alia* credit from input suppliers or traders, factoring, warehouse receipts, and contract farming.<sup>b</sup>

*Contract farming*, the most common value-chain approach, is a transaction between buyers and agricultural producers that is governed by a contract that may stipulate product and quality attributes, production methods, and/or the commitments for the future sale (e.g., timing, location, price).<sup>c</sup>

a. See Ledgerwood (2013) for more background on the distinctions between institutional types of financial service providers.

b. Miller and Jones (2010) is an excellent resource on agricultural value-chain finance.

c. See da Silva (2005).

## 1. Linkages Between Agriculture, Poverty, and Access to Finance

Interest in agricultural development waned at the end of the 20<sup>th</sup> century. Its share of official development assistance dropped from 18 percent in 1979 to 3.5 percent in 2004, and declined in absolute terms from a peak of US\$8.0 billion in 1984 to US\$3.4 billion in 2004 (World Bank 2007).<sup>3</sup> But smallholders are back in the spotlight. The food price crisis of 2007–2008 played a large role in refocusing the international development community on agriculture. Building on this momentum, developing-country governments made agriculture a higher priority, political alliances such as the G-20 recognized its leverage in poverty alleviation, organizations such as the Alliance for a Green Revolution in Africa focused on smallholders to reduce hunger and poverty, and research centers and governments began exploring ways that smallholders could use mechanisms such as payments for environmental services to adapt to climate change (IFAD 2011a). Financial service providers gained some ground in rural and agricultural communities, and new approaches to agricultural development have more fully engaged the private sector. This section offers a brief background on the pivotal role of agriculture in rural households and poverty reduction, and outlines the role of financial services in meeting both general household goals and objectives specific to agriculture.

### a. Key role of agriculture in national economies, rural households, and poverty reduction

To appreciate the scale of the global agricultural sector, consider that in 2010, of the approximately 5.7 billion people living in low- and middle-income countries worldwide, more than half—an estimated 3.1 billion people—lived in rural areas (IFAD 2011b; World Bank 2010).<sup>4</sup> Among these rural households,

estimates suggest that more than 80 percent are engaged in some kind of agricultural activity, at varying levels of focus and intensity (IFAD 2011b; Valdés et al. 2009). All told, estimates suggest that there are up to 2.5 billion people living in 500 million smallholder farm households in the developing world.<sup>5</sup>

At the national level, agriculture plays a critical role in the economies of poor countries. In over half of the 48 nations designated as least developed countries (LDCs) by the United Nations, agriculture contributes more than 20 percent of the gross domestic product (GDP), and in 10 of them it accounts for over 40 percent of GDP (IFAD 2011b).<sup>6</sup> Agriculture is also a major employer of rural labor in developing countries, often providing wage income to those who do not have any land or enough of their own to cultivate (Valdés et al. 2009). The Food and Agriculture Organisation (FAO) of the United Nations estimates that agriculture provides employment to 1.3 billion people around the world, 97 percent of whom live in developing countries (World Bank 2007). Women also play a key role as 43 percent of the agricultural work force (FAO 2011). Agriculture also provides a source of vitality and social welfare in rural communities that can mitigate urban shocks (World Bank 2007).

Despite the importance of agriculture, agricultural productivity in low- and middle-income countries remains quite low. Half of the world's undernourished people and a majority of people living in absolute poverty are smallholder farmers (Hazell, Poulton, Wiggins, and Dorward 2007). Limited access to improved seeds and inputs, declining soil fertility, poor connectivity to markets, weak infrastructure, and inadequate access to financial services continue to hinder agricultural growth. In fact, most rural communities are characterized by poverty. An estimated 75 percent of the world's poor and chronically undernourished people live in rural areas, and most of them directly or indirectly

<sup>3</sup> Note that both figures here are in 2004 U.S. dollars.

<sup>4</sup> The World Bank classifies countries as low, middle, or high income based largely on their gross national income per capita.

<sup>5</sup> See Footnote 1.

<sup>6</sup> LDCs are designated by the United Nations according to the following criteria: very low incomes (i.e., three-year average per capita gross national income less than US\$750); low levels of human assets; high economic vulnerability; and a population of less than 75 million.

depend on agriculture for their livelihoods (World Bank 2012; FAO 2002). Even with urbanization, a large majority of poor people will continue to live in the rural areas of the developing world for at least another 20 years (Hazell 2007).

These links among agriculture, poverty, and rural households also present an opportunity. Agriculture has been found to play a powerful role in poverty reduction, especially when agricultural development has focused on small farms and the staple crops they tend to grow (Hazell, Poulton, Wiggins, and Dorward 2007). Thirtle, Lin, and Piesse (2003) estimate that a 1 percent increase in crop productivity reduces the number of poor people by 0.72 percent in Africa and by 0.48 percent in Asia. In cross-country studies, Ligon and Sadoulet (2007) concluded that a 1 percent increase in GDP due to agriculture led to a more than 6 percent increase in expenditures among the poorest decile of the population. And Gallup, Radelet, and Warner (1997) calculated that a 1 percent increase in per capita agricultural output generated a 1.6 percent increase in income for the poorest 20 percent of the population.<sup>7</sup> Likewise, Christiaensen, Demery, and Kuhl (2010) found that agricultural growth is as much as 3.2 times more effective at reducing US\$1 per day poverty than nonagricultural growth in low-income and resource-rich countries. There is clearly scope for gains in agricultural productivity to make greater contributions to poverty reduction.

## **b. Diversity of rural incomes and the varied importance of agricultural activities**

The 2008 World Development Report on agriculture (World Bank 2007), the 2011 Rural Poverty Report (IFAD 2011b), and the Rural Income Generating

Activities (RIGA) project<sup>8</sup> examined poor rural households, their income sources, and the role of agriculture in their livelihoods. Their results indicated that rural households receive income from a range of sources, including agricultural production (e.g., crops, livestock, fisheries), wage-earning employment (in both agricultural and nonagricultural businesses), self-employment, and transfer payments, which include private remittances and public income support transfers (e.g., conditional cash transfers [CCTs]) (IFAD 2011b; World Bank 2007). In most countries in the RIGA database, 30–60 percent of rural households earned approximately 75 percent of their total income from more than two sources (IFAD 2011b). Since some employment, particularly in agriculture, is seasonal and weather-dependent, maintaining a range of household income streams from different sources helps mitigate the risk of a decline in any one (Davis et al. 2010).

No clear pattern has emerged between the relative poverty of households and the importance of their agricultural income. Valdés et al. (2009) and Davis et al. (2010), for example, found that lower-income rural households earned the highest proportion of their income from crop and livestock activities and agricultural wage labor, while higher-income households earned the majority of their income from nonagricultural activities. In contrast, Jayne, Mather, and Mghenyi (2010) concluded that the poorest quintile of households in Ethiopia, Kenya, Mozambique, Rwanda, and Zambia generated a higher proportion of their income from off-farm sources.<sup>9</sup> While the relative importance of agricultural income in a household is influenced by a number of factors (e.g., quality of the resource base, access to markets, perceptions of risk, off-farm alternatives), agriculture remains an important activity and meaningful income source in most rural households (Valdés et al. 2009; Davis et al. 2010).

<sup>7</sup> See DFID (2005); OECD (2006); and Thirtle, Lin, and Piesse (2003).

<sup>8</sup> The RIGA project is a collaboration among FAO, the World Bank, and American University. The RIGA database aggregates detailed household surveys from Albania and Bulgaria in Eastern Europe; Ghana, Madagascar, Malawi, and Nigeria in Africa; Ecuador, Guatemala, Nicaragua, and Panama in Latin America; and Bangladesh, Indonesia, Nepal, Pakistan, and Vietnam in Asia. It distinguishes seven categories of income for poor rural households: (1) crop production, (2) livestock production, (3) agricultural wage employment, (4) nonagricultural wage employment, (5) nonagricultural self-employment, (6) transfers, and (7) other. While 15 countries in the RIGA database cannot alone capture the breadth and diversity of low- and middle-income countries, a relatively consistent picture did emerge across this sample; see Davis et al. (2010), Valdés et al. (2009), and Winters et al. (2009).

<sup>9</sup> See also the six case studies presented in Valdés et al. (2009): some found off-farm sources of income more significant to poorer rural households, others found the reverse.

### c. Meeting common household objectives with a range of financial services

All households—at all income levels, in urban and rural areas, and those active in and outside of agriculture—share a number of overarching objectives. And to work toward them they use a variety of financial tools (e.g., savings, transfers, credit, insurance). These common household objectives typically include the following:

- Meeting regular expenses, including the production costs of most everyday crops sold through local informal markets
- Making investments or large purchases related to improved housing, income-generating assets, consumer durables, and others
- Financing foreseeable, programmed expenses related to life events, such as births, education, weddings, retirement, and deaths
- Responding to emergencies, illnesses, and other sudden requirements for money
- Migrating or financing the migration of someone in the household

Most financial products have the flexibility to serve multiple objectives, just as a range of products can also be used to work toward one goal. Money is fungible. Parents organizing their child's wedding may search for funds from a variety of sources: a pawn loan, a loan that was given to plant rice, loans from neighbors, their savings, contributions from family and friends, remittances from sons and daughters working in the city. When the parents pay for the wedding dinner, the caterer doesn't ask where the money came from, just as the clerk at the farm supply store doesn't care how they pay for the few bags of seed they buy every year.<sup>10</sup> This flexibility suggests that a household's general portfolio of financial services includes a range of products that can address most of their objectives, including standard agricultural production. But there are some notable instances that call for specific tools to finance agricultural activities.

### d. Financing specific agricultural activities with tailored financial tools

Under the canopy of these general household objectives, and the related household demand for a generic suite of financial services, agricultural households may also demand an additional set of financial services related to some specific agricultural activities or circumstances. A number of production-related factors dictate when specialized financial products or techniques would be required:

- When households are relatively more dependent on farming for their total income and grow relatively few or no cash crops, which can create more extreme cyclical liquidity management problems
- When investments needed for production are large relative to a farmer's annual income and require a longer term for loan repayment
- When production is relatively riskier for farmers, due to the sensitivity of crops to pests or climatic events; the specific production methods, quality standards, and volumes required by buyers; and/or price volatility
- When production fails due to catastrophic events, exhausting all financial resources, and yet must be restarted the following season

Such specific agricultural activities and circumstances would call for a range of supply responses from both informal and formal sources (though the household's capacity to service loans would still be determined by its overall cash flow). Generally, as households get more intensively engaged in producing higher-value cash crops, and as these activities generate a more significant proportion of their total income, their need for specialized financial tools may increase. The presence of agricultural income and its characteristics could also influence the design of more general products (e.g., the payment of school fees due at the beginning of the academic year could be tied to payments from crop or livestock sales at other times of year).

<sup>10</sup> The fungibility of loans has vexed past efforts to provide financing specifically to increase agricultural production, such as government-led "directed lending" initiatives run by state agriculture banks. When borrowers used funds for other production needs or household consumption, the sponsors or funders of those programs tended to view this as misuse. (See Adams and Von Pischke [1980] and Adams, Graham, and Pischke [1984] on the performance of early targeted agricultural lending programs.) More recently, the experience with microcredit and further analysis of the financial lives of the poor have established that clients, including smallholder households, tend to be relatively able, rational managers of complex financial portfolios who typically respond to the same nudges (and make the same short-sighted choices) widely common to others.

Financing agricultural activities is challenging. Agriculture is by nature seasonal, with time passing between cash outflows and inflows. Farming is rooted in the quality of the resource base, exposed to the volatility of weather and prices, and vulnerable to pests and spoilage. Its irregular cash flows and risks further complicate an already complex system of household cash management. This in turn creates risk and liquidity management challenges for financial service providers, in that farmers in the same area generally want to borrow at the same time, and are often undertaking the same activities, and therefore are exposed to the same risks.<sup>11</sup>

Identifying the distinctions among agricultural households is an important step in understanding and mitigating these risks. It also contributes to an understanding of their demand for financial services, which could help address their production challenges and improve their portfolios of financial services, and motivate the segmentation exercise presented in the next section.

## 2. Three Segments of Smallholder Agriculture Households

This paper examines the estimated 500 million smallholders and attempts to broadly identify segments of agricultural households that share similar characteristics in terms of what they grow and how they produce it; what they consume at home and what they sell in the market; and how those markets are organized. The objective is to facilitate a greater understanding of the specific demands for financial services, including financing for agricultural activities, within each segment.

### a. General parameters in segmenting agricultural households

To improve the success of agricultural interventions, there is wide interest in segmenting farming

households.<sup>12</sup> That said, segmentation is challenging. Successful segmentation depends on the availability of a great deal of up-to-date demographic information, as Morton (2007) outlines, but there are no standard, widely accepted definitions of smallholders or subsistence farmers. International bodies such as FAO and the World Bank do not track data disaggregated to these categories. The temporal orientation of the segmentation also guides what data are considered relevant. Some approaches focus on the current context of the household—examining its asset base, demographics, income sources, and other profiling information—and are more applicable to global landscape research. Others consider the household’s aspirations, including how its beliefs and values may influence its likelihood to adopt new technologies or pay for new services, and are more applicable to product design.<sup>13</sup> Each approach has its merits and relevance to a specific line of questioning, as explored below.

The objective of segmentation is to create a general framework for analysis. Though useful, such a simplification cannot fully portray the great variety of households. Following Morton’s (2007) idea of a continuum, each household falls along a spectrum marked with clear points, each with its own distinctive characteristics. Some households may land squarely on one point and clearly match the profile of that segment, while many will fall between two points and share some traits from both. One key example is in dairy: In “zero-grazing,” a dairy cow is kept in a stall and brought fodder (instead of grazing in pasture), and the milk is often sold into a highly structured, often urban-oriented value chain. In India, for example, the Indian Dairy Cooperatives Network has 12 million members, 60 percent of whom are smallholders, many among them landless women (Valdés et al. 2009). Staal et al. (2001) and Ngigi, Ahmed, Ehui, and Assefa (2010) document similar practices among smallholders in Kenya who produce milk for the Nairobi market.

<sup>11</sup> See Jessop et al. (2012), Nagarajan and Meyer (2005), and Meyer (2011) for a thorough overview of agricultural finance and its challenges.

<sup>12</sup> See Faz and Breloff (2012); GIZ (2011); Hansen, Carroll, Bradlow, and Ahmad (2012); IFC (2011); Jaleta, Gebremedhin, and Hoekstra (2009); Jayne, Mather, and Mghenyi (2010); Nagayets (2005); OECD (2006); Orden, Torero, and Gulati (2004); Seville, Buxton, and Vorley (2011); Staal et al. (2001); Torero (2011); USAID (2011); Valdés et al. (2009); von Braun (2005); and World Bank (2007).

<sup>13</sup> Hansen (2012), personal communication.

Households, like people, are dynamic. A household's place in one segment today may not reflect its position tomorrow, or over the longer term. Livelihoods change, income streams ebb and flow, and people move in and out of poverty, buoyed by opportunity and burdened by shocks. IFAD (2011b), for example, found that in nine countries in Asia, sub-Saharan Africa, and Latin America 10–20 percent of the population moved into or out of poverty within a period of 5–10 years; in some cases, as much as 30 percent of the population shifted. Dercon and Shapiro (2007) argued there are more people considered sometimes poor than always poor.

Households may also actively be working to move from one segment to another, and generally moving toward a portfolio of economic activities that is less risky and offers higher returns. Some may want to get out of agriculture altogether. Farming is hard, physical work, often for little if any return, and farmers may have less and less interest or even ability to continue in agriculture as they age, to the extent that they have a choice. And no matter how successful their agricultural activities may be, they may also want to ensure that their children have other, less physically gruelling alternatives to earn income and do not follow them into farming. Young people often tend to look for career paths away from agriculture anyway, which they may perceive as a last resort.<sup>14</sup> Thus any segmentation framework offers at best a snapshot of households at the given moment.

## **b. Key examples of segmentation among agricultural households**

There have been a number of different approaches to the segmentation of agricultural households. Some distinguish among broad groups of farmers. As part of a landscape study on contemporary trends and challenges in agricultural finance, for example, GIZ (2011) recognized two segments of farmers: "a vast number of small, subsistence-oriented farmers with highly-diversified income sources," and "market-oriented farmers. . .for whom agriculture is the main economic activity." Torero (2011); von Braun (2005); and Orden, Torero, and Gulati (2004) further refined

this characterization by adding a third general segment, differentiating among subsistence farmers, farmers oriented toward local and national markets, and globally competitive market-oriented farmers. Jessop et al. (2012) made similar distinctions, and also included a fourth segment of large agricultural estates (e.g., oil palm, coffee, tea).

The most common way to differentiate among small farms is by the size of the landholding or the number of livestock, as detailed in Nagayets (2005) and von Braun (2005). While the logic of this approach is clear, it has a number of limitations. Knowing only the number of hectares farmed indicates nothing about what is grown, where it is sold, the quality of the soil, access to irrigation or the reliability of the rains, or the state of the surrounding infrastructure and services. It also offers no clear indication about the balance between family and hired labor. In addition, farm size is highly region-specific, and what is considered small in one country would be considered quite large in another: A 100 hectare farm is considered modest to some in Brazil, for example, while it would be quite large by the standards of sub-Saharan Africa (Rabo Development 2011).

Another approach to the segmentation of agricultural households is based on the extent of the farm's commercialization. Jaleta, Gebremedhin, and Hoesktra (2009) presented a thorough outline of how this is evaluated. Some research measured commercialization according to the production of cash commodities; other studies focused on how agricultural households make decisions about what to produce and how to market it. The common interpretation is that commercialized farmers make production decisions based on their own comparative advantage and signals from the market, whereas subsistence farmers largely consider their own food requirements and the feasibility of generating outputs, and only sell any surplus that remains after household needs are met. Jayne, Mather, and Mghenyi (2010) used survey data on staple grain markets in eastern and southern Africa to identify four categories of

<sup>14</sup> See Mwaura (2012), Tadele and Ayalew (2012), and White (2012).

smallholder households: sellers of staple grains, buyers of staple grains, households that both buy and sell grain in a given year, and those that neither buy nor sell.<sup>15</sup> Similarly, Seville, Buxton, and Vorley (2011) proposed four segments of agricultural households according to farmers' market participation.

Income is also commonly used to segment farming households. The World Bank World Development Report on agriculture (2008), working first at the global level, classified countries into three worlds of agriculture for development—agriculture-based, transforming, and urbanized—and then at the household level identified five livelihood strategies according to the relative importance of income from agriculture, labor, and migration. Using relative income or income composition to segment households, however, is problematic. It does not reflect important regional and national variation in income, or that landholdings vary in their potential to generate income according to the quality of soil, choice of crops, access to markets, and other factors. To address these limitations, IFC (2011) segmented agricultural households using a proxy for income that compares the annual net income from farming (after expenses) with the annual net earnings of a skilled laborer in that country or region. They then identified four segments of primary agricultural producers that differ in respect to their landholding, use of labor, level of commercial production, capacity, and position in the value chain.

Other approaches to segmentation use a blend of indicators. Looking at low-income households in Mexico, Faz and Breloff (2012) collected data on households' incomes, aspirations, concerns, and financial management strategies and defined four lower-income livelihood segments, including one "seasonal/agricultural worker" segment. They then outlined the financial services that would be most valuable for each. To tailor development interventions to assist smallholder dairy producers in Kenya, Staal et al. (2001) conducted a principal component and cluster analysis, identifying four groups that varied according to their level of intensification, available resources, and access

to inputs and markets. Expanding the variables considered, OECD (2006) considered the "financial and physical holdings of the household; the access to labour and product markets and to a variety of services needed to sustain livelihoods, including finance, information and infrastructure; the provisions for health care, education, and training and upgrading skills (especially for women); and the social networks that enable households to benefit from their participation in economic, political and social institutions and organisations" and delineated five "rural worlds," each with its own relationship to agricultural production. Finally, the approach to segmentation used by Valdés et al. (2009) was even more detailed. Based on the RIGA dataset, 12 groups of rural households were identified, varying according to their landholdings, the level of education of the head of the household, and an index measuring access to infrastructure.

Within this rich literature on segmentation, relatively few papers took the added step of estimating the population size of the defined segments. The exceptions—including Seville, Buxton, and Vorley (2011); Jayne, Mather, and Mghenyi (2010); Valdés et al. (2009); and Staal et al. (2001)—collected their own data, or reviewed the data of others (Barrett 2010). In one case, Staal et al. (2001) classified 51 percent of dairy farmers in their survey as "informal resource poor," the largest of the four segments, and only 7 percent as "specialised dairy" producers (i.e., those who sell into multiple markets and purchase large amounts of fodder). Seville, Buxton, and Vorley (2011) estimated that 40–50 percent of farmers were subsistence farmers and only 1–2 percent were commercial farmers, which appears closely linked to the Jayne, Mather, and Mghenyi (2010) finding that only 2 percent of farmers in Kenya, Mozambique, and Zambia generated 50 percent of all maize sales.

### **c. Three segments of agricultural households: Their characteristics and estimated size**

The segmentation proposed in this paper is intended to identify and determine the approximate size of distinct groups of smallholder agricultural

<sup>15</sup> See Barrett (2010) for a thorough discussion of smallholder market participation (i.e., net buyers and net sellers) in eastern and southern Africa.



households in low- and middle-income countries and differentiate their demand for financial services, particularly for financing related to their agricultural activities. This analysis defines three distinct segments of poor households that depend on agriculture—noncommercial smallholders, commercial smallholders in loose value chains, and commercial smallholders in tight value chains. Each segment is discussed below and outlined in Table 1. Their demand and supply for financial services is addressed in the following section.

Drawing from the literature, this segmentation framework is based on the general types of crops grown on the farm (e.g., staple crops, high-value cash crops), the way that smallholders engage with markets (e.g., buyer, seller, both in different periods), and how those markets are organized (e.g., local spot markets, export markets with high standards and specific contractual obligations). With the overall objective of increasing financial inclusion, this approach was designed to bring household agricultural activities to the fore (independent of their relative importance to total household income) and illuminate the financial relationships and transactions behind them, identifying areas where more formal, specialized agricultural finance could add value to existing portfolios of financial services.

The approximation of the size of the segments is based on the estimate that there are up to 500 million smallholder farms worldwide and 2.5 billion people living in these households.<sup>16</sup> To approximate the size of the three segments, this paper draws on findings from the World Bank RuralStruc dataset (IFAD 2011b); Jayne, Mather, and Mghenyi (2010); and Seville, Buxton, and Vorley (2011). The paper estimates that 60 percent of the total population of smallholder farms would be considered noncommercial smallholders, 33 percent would be commercial smallholders in loose value chains, and 7 percent would be commercial smallholders in tight value chains. Then, to approximate the total household population of each segment, the paper uses an average household size of five persons, based on Conway (2012) and Bongaarts (2001).

Annex 1 provides further detail on the methodology behind this approximation.

1. **Noncommercial smallholders**—approximately 300 million smallholder farmers—are generally considered subsistence farmers. Among the world’s poorest households, they farm not as a vocation or strategic business choice, but to contribute to their own sustenance and survival. Agricultural production is concentrated in staple crops (e.g., cereals, roots and tubers, pulses) and could include small livestock (e.g., hens, goats, pigs). Access to land, technology, education, markets, and information about weather or production methods is very limited. Very few purchased inputs and little mechanization are used (if any), and the household is highly vulnerable to income and other shocks. Outputs are relatively low and consumed largely by the household. They are generally buyers of food (supplementing their own production) and sellers of labor, which limits their ability to produce. And they may endure periods of food deficits throughout the year. Any irregular, small amounts of surplus would be sold in an informal, local market. Noncommercial smallholder households are not connected to a structured value chain of any kind. They are largely limited to informal financial mechanisms and simple tools, such as local savings and loan groups, to meet their relatively basic financial service needs.
2. **Commercial smallholders in loose value chains**—approximately 165 million smallholder farmers—are still considered very poor, but tend to be somewhat less so than the noncommercial smallholder segment. Their crop mix usually focuses on staple crops and could also include some higher-value crops (e.g., sugar, tea, coffee, oilseeds, fibers, energy crops). They have access to somewhat more land than the first segment, though they still have limited access to inputs, financial services, and information about weather, markets, and prices and tend to rely on unimproved seeds and traditional production methods. Commercial smallholders in loose value chains generate some level of surplus to sell, usually in informal local or

<sup>16</sup> See Conway (2012); Hazell (2011); Hazell, Poulton, Wiggins, and Dorward (2007); IFAD (2011c); Nagayets (2005); and World Bank (2007).

Table 1. Three Segments of Agricultural Households in Low- and Middle-Income Countries

	Notes	1. Noncommercial smallholders	2. Commercial smallholders in loose value chains	3. Commercial smallholders in tight value chains
<b>Population estimates</b>	500 million smallholders <sup>a</sup> 2.5 billion people in smallholder households	300 million smallholders 1.5 billion people in households	165 million smallholders 825 million people in households	35 million smallholders 175 million people in households
<b>Gender of farmer</b>		Women are more likely to engage in subsistence farming <sup>b</sup>		Women are less likely to cultivate cash crops <sup>c</sup>
<b>Land size estimates</b>	Regional differences in land size are particularly important, as are considerations of soil quality, access to water, inputs, and markets, and the chosen agricultural activities and crops.	<ul style="list-style-type: none"> <li>No land or less than one hectare<sup>d</sup></li> <li>"Most rural households own no land, or only small plots of land... Landholdings of operated land in most of the RIGA countries are small; the vast majority have less than one hectare in size."<sup>e</sup></li> </ul>	<ul style="list-style-type: none"> <li>One to two hectares</li> <li>"The vast majority of farmers in developing countries are smallholders, and an estimated 85% of them are farming less than two hectares."<sup>f</sup></li> <li>An estimated 90% of farms in the developing world are smaller than two hectares.<sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>At least two hectares</li> <li>85% of the farmers participating in contract farming have at least two hectares of land.<sup>h</sup></li> </ul>
<b>General crop mix</b>		Staple crops	Staple crops Some cash crops	Cash crops Relatively few staple crops
<b>Engagement with markets</b>		<ul style="list-style-type: none"> <li>Most production consumed by the household for subsistence, and additional food is bought in the market</li> <li>Very little, if any, engagement with any markets as a seller of food</li> </ul>	<ul style="list-style-type: none"> <li>Some production consumed by the household for subsistence</li> <li>Reliable surplus of staple crops sold through relatively informal, local markets</li> </ul>	<ul style="list-style-type: none"> <li>Some production may be consumed by the household for subsistence</li> <li>Reliable surplus of staple crops could be sold through relatively informal, local markets</li> <li>Cash crops sold in regional or export markets through contract farming<sup>i</sup></li> </ul>
<b>Access to improved agricultural technology</b>		Very limited if at all	Limited	Good, thanks to value-chain farming bundles provided by the buyer
<b>Access to financial services</b>		Limited, informal if at all	Limited and informal	Informal and some formal, some of which is provided by the buyer

a. IFAD (2011b)

b. IFAD (2011b)

c. IFAD (2011b)

d. One hectare is equal to approximately 2.5 acres.

e. Valdés et al. (2009)

f. World Bank (2007)

g. Anriquez and Bonomi (2007)

h. IFAD (2011b)

i. World Bank (2007)

regional markets. These households have access to a wider range of financial services than noncommercial smallholders and may be looking for opportunities to further diversify their assets and sources of income.

3. **Commercial smallholders in tight value chains**—approximately 35 million smallholder farmers—are generally less poor and more resilient than the other two segments and take a more business-like approach to farming. A sizeable portion of their agricultural income may be derived from higher-value specialty crops, though they are also likely to grow some staple crops as well. They tend to manage at least two hectares of land (subject to important regional differences) and, due to their place in relatively more structured value chains, have access to buyer-provided bundles of improved seeds, inputs, agricultural and weather information, finance, and secure markets and prices. Commercial smallholders in tight value chains have the capacity to generate reliable, high-quality outputs that are sold on a contract basis through relatively highly organized value chains. Staple crops may be sold more informally through local and regional markets. As relatively larger producers, they may hire people to support some of their agricultural activities, including members of the two other segments. They are likely to demand and use a wider range of financial services from both formal and informal financial service providers than the other two segments.

There are two important points about this segmentation framework to keep in mind. First, while this approach follows general trends in household poverty status (i.e., subsistence farmers tend to be poorer than farmers linked to local markets, who in turn tend to be poorer than farmers linked to national or international markets), the intention is not to assert a correlation between agricultural activities and household wealth. A great majority of rural households do engage in agricultural activities, but these are not their only sources of income, and they may not be their most important ones. The segmentation framework proposed here, however, is designed to highlight differences in household demand

for financial services related to agriculture and therefore focuses on these activities and related market relationships.

Second, this segmentation model does not intend to suggest that only some segments are bankable while some are not “ready” for formal financial services and should be written off until they somehow become less poor or get out of agriculture. Instead this model highlights that different kinds of households have different kinds of needs, and that this variety in demand cannot be met by the same suite of financial products, terms of service, or even pool of formal financial service providers. The generally poorer noncommercial smallholders, for example, tend to access most financial services through informal mechanisms, and it remains to be seen whether formal financial intermediaries can improve on how they manage their money today. This critical question in financial inclusion is explored in the next section.

### 3. Improving the Financial Portfolio of Each Segment of Agricultural Households

This section examines the three segments of farming families and the extent to which they are able to use the formal financial services that have been developed for the poor over the past three to four decades. The financial portfolio of each of the three segments of agricultural households is outlined in the tables that follow, identifying the demand for financial services specific to each segment and the financial service providers most likely to supply relevant products. Though these demand and supply portfolios greatly simplify the real complexities and variations among poor agricultural households, three distinctive portfolios of formal financial products start to take shape. It begins to become clearer what financial goals may be well served with either general finance or a somewhat tweaked form of microfinance, and what goals may require more specialized approaches tailored to the specific agricultural circumstance.

This framework outlines household demand as it corresponds to broadly grouped household

goals and general categories of financial services (e.g., savings, credit). Whether a family is saving to send their children to school, to buy a new roof for their home, or to repair a plow, for example, these are all called “large purchases, investments, or programmed expenses” in these tables. In other cases, similar products may be listed separately if they come from different providers and have specific conditions or if they are offered only by certain entities (e.g., financing for farming inputs). For example, inputs for staple crops sold into loosely organized value chains may be purchased or financed from input suppliers (if they are purchased at all), while inputs for high-value crops sold into tightly organized value chains are typically provided by the buyer.

The different segments may also use the various products in different ways. For poorer households, mobile money may be largely a mechanism to receive money transfers from family members working in the cities and to send money home to help the family through hard times. Better-off families engaged in tight value chains, in addition to using the more common money transfer functions, might also receive harvest payments from buyers or pay input providers directly.

Important information about how poor households use financial tools has come from key publications, such as the FinMark Financial Diaries,<sup>17</sup> *Portfolios of the Poor* (Collins, Morduch, Rutherford, and Ruthven 2009), and *The Poor and Their Money* (Rutherford 2001). Though these seminal works have informed this analysis, the current data on smallholder households and their demand for financial services related specifically to their range of agricultural activities are very limited. More information is needed on agricultural households to more clearly understand their demand for financial services. Increasing transparency on the products that are already available is another important step. These insights will help align general forms of finance with products tailored to agricultural activities, and add greater overall value to the financial portfolios of agricultural households.

### a. Financial portfolio of noncommercial smallholders

**Approximately 300 million farmers would be considered noncommercial smallholders**, and a total of roughly 1.5 billion people live in these households. Noncommercial smallholders have incomes that are low and highly variable, and they are vulnerable to significant periods with no income at all. They probably do not own their own land, or don’t own enough to be commercially successful. Family members often work as day laborers on the farms of others. Their financial transactions tend to be too small to interest the formal financial sector. Any formal financial services beyond remittances or conditional cash transfers (CCTs) are likely to come from development finance organizations, such as state development banks.

**Demand.** As outlined in Table 2, noncommercial smallholders translate their household objectives into a series of financial goals and, by extension, demands for financial services that are relatively modest, compared with the other household profiles outlined here. To make significant purchases or programmed expenses, they look for avenues to save or take loans; to deal with emergencies or take advantage of short-term opportunities, they turn to credit; and to smooth or supplement household income, they may receive money transfers in the form of remittances or CCTs.

To mitigate risk, noncommercial smallholders may look for opportunities to join burial societies or take life insurance, which in some regions are accessible and widely used. Even health insurance is available to some very poor rural households, though the success of such interventions depends as much on a sound financial model as the presence of easily reachable, reliable health care providers. More complex forms of insurance that are both challenging to understand and expensive to launch (e.g., weather index-based insurance) have not yet reached noncommercial smallholders (or smallholders in general) on a sustainable, cost-covering basis at a notable scale.

<sup>17</sup> The Financial Diaries. <http://www.financialdiaries.com/index.htm>. Accessed 1 June 2012.

**Table 2. Demand and (Potential) Supply of Formal Financial Services: Noncommercial Smallholders**

Demand		Supply	
Overarching category	Financial goal	Financial service provider	Product
<b>Savings</b>	Investments, large purchases, and/or programmed expenses	Savings-and-loan groups promoted by nonprofits	Contractual, periodic, savings, with programmed disbursements
<b>Credit</b>	Investments, large purchases, and/or programmed expenses	Microlenders that use a group-based lending technique	Solidarity group or village-banking-type loan
	Emergencies and sudden requirements	Savings and loan groups promoted by nonprofits	Loans by groups made with internal funds for short terms
	Emergencies and sudden requirements	Licensed pawn-based lenders, including banks	Pawn-based loans for very short terms (commonly gold, other jewellery)
<b>Transfers</b>	Regular expenses	Remittance companies, telecommunication companies, post offices	Money transfer services, mobile money, CCTs
<b>Risk management tools</b>	Emergencies and sudden requirements	Microlenders	Group-based life and funeral insurance policies added to small loans

Note: Demand from this segment is relatively basic, and there are comparatively few areas where formal financial services can add value and be offered profitably.

Clients in this category are reached largely through group mechanisms of some sort that transfer significant portions of transaction costs to themselves. This is changing with the increasing importance of technology—and particularly mobile phones—in delivering financial services.

**Supply.** The demand for financial services from noncommercial smallholders poses three fundamental challenges to financial service providers:

1. Income in noncommercial smallholder households is low, highly irregular, and unpredictable.
2. The average amount of each financial transaction is tiny.
3. The cost of developing a product may be large relative to its potential income.

These barriers would seem to preclude mainstream formal financial institutions from ever reaching noncommercial smallholders, except to the extent that they work through agency relationships to channel remittances or CCTs. And yet, as demonstrated in Collins, Morduch, Rutherford, and Ruthven (2009) and Rutherford (2001), these households are very active money managers and connect to some basic forms of financial services.

The few financial service providers meeting the needs of noncommercial smallholders include pawn-based lenders that make short-term loans usually collateralized by gold or jewellery; microlenders using a group-based methodology; remittance companies or telecommunications firms channelling money from family members or CCTs; and, perhaps most importantly, simple, locally based savings-and-loan groups promoted through nonprofits. Savings-and-loan groups are the most significant financial tool available to noncommercial smallholder households. They allow group members to regularly save and borrow small amounts of money and do not require collateral, fees, or financial sophistication to participate.<sup>18</sup>

**Gaps.** The demand for financial services among noncommercial smallholders is relatively narrow, and some services more common to the other two segments tend to be beyond the scope of their

<sup>18</sup> Savings-and-loan groups take many forms around the world, including rotating savings and credit associations, accumulating savings and credit associations, the millions of self-help groups in India, and village savings and loan associations (VSLAs). VSLAs alone now reach an estimated 4.6 million participants in 54 countries (see Economist 2011).

needs. Contract farming, for example, is by definition unfeasible at this level (see Section 3d), and credit from agricultural suppliers is uncommon. Household cash flows are usually not robust or diversified enough to ensure repayment of loans for agricultural production, and the family is unlikely to have collateral to offer that would be acceptable to a formal lender.

## **b. Financial portfolio of commercial smallholders in loose value chains**

**Commercial smallholders in loose value chains number approximately 165 million people**, and roughly 825 million people live in these households. Commercial smallholders in loose value chains usually have access to more land than noncommercial farmers, though still very small amounts, and they tend to be less poor than noncommercial smallholders. Their household income comes from a diverse range of both agricultural and nonagricultural activities. They tend to sell into open, unstructured local markets, not the tightly organized value chains characteristic of export crops. They are also in a position to conduct financial transactions at a size and frequency that could be attractive to formal financial institutions, including transactions related to the sale of harvest proceeds, loans in support of agricultural production, and small consumer loans for personal consumption. Commercial smallholders in loose value chains probably have a higher capacity to save and are relatively more accustomed to saving in some form to get through the periods between harvesting their principal cash crops. This household segment has relatively few hungry days in the year, unless there has been a climatic event that adversely affects the harvest.

**Demand.** Commercial smallholders in loose value chains tend to use a more robust portfolio of financial services than noncommercial smallholders, with a wider range of suppliers available to meet their wider demand for financial services. They would demand a larger array of savings products, including, for example, both harvest savings accounts that use one season's profits to pay for next season's inputs (see Section 3e) and standard passbook savings accounts

in which they can deposit the small amounts of regular income from nonagricultural activities. While they may participate in larger savings-and-loan groups that include relatively less poor members and therefore manage larger pools of money, these groups do not play as central a role as in noncommercial smallholder households. Instead they complement a range of other suppliers, including banks, credit unions, deposit-taking microfinance institutions (MFIs), input suppliers, and microcredit providers with a degree of specialization in agricultural lending.

Receiving money, including income-supporting CCTs and contributions from relatives working overseas or in urban centers, is also important to this segment, and brings them in contact with remittance and telecommunications companies. Mitigating risk is also a challenge, and they, too, want to join burial societies or take life insurance. In some cases, this segment has access to health insurance through a microcredit group loan. More complex forms of insurance (e.g., weather index-based insurance) whose delivery meets reasonable performance expectations (e.g., reliable, timely payouts for insured events) are typically not available to commercial smallholders in loose value chains on a commercial basis or at a wide scale.

**Supply.** The profile of commercial smallholders in loose value chains presents three fundamental challenges to financial service providers:

1. Their income includes a component that is highly seasonal.
2. The average size of their transactions is on the lower end of the scale of what can profitably be offered.
3. The cash flows and income related to their agricultural production may be significant, and should be well understood, together with all other sources of household income, in considering the extension of credit.

These challenges could pose significant costs, but a number of financial service providers have overcome these barriers and serve commercial smallholders in loose value chains. Banks, credit unions, and licensed

**Table 3. Demand and (Potential) Supply of Formal Financial Services: Commercial Smallholders in Loose Value Chains**

Overarching category	Demand	Supply	
	Financial goal	Financial service provider	Product
Savings	Regular expenses: Pay for farming inputs at the right time	Banks, credit unions, licensed deposit-taking MFIs	Harvest savings account—depositing proceeds of sales for a later, agreed use
	Investments, large purchases, and/or programmed expenses	Banks, credit unions, licensed deposit-taking MFIs	Passbook savings account into which family members deposit daily and weekly income from nonfarming activities
	Investments, large purchases, and/or programmed expenses	Savings-and-loan groups	Contractual, periodic, savings from nonfarm activities, with programmed disbursements
Credit	Regular expenses: Pay for farming inputs at the right time	Input suppliers	Supplies on credit if farmer has a long-standing relationship with one and is a steady producer
	Regular expenses: Pay for farming inputs at the right time	Microlenders with specialized capacity, agricultural banks	Agricultural production loans—tied to cash flow cycle, but maintaining general credit obligation for the household
	Investments, large purchases, and/or programmed expenses	Microlenders that use a group-based lending technique	Solidarity group or village banking type loan
	Emergencies and sudden requirements	Licensed pawn-based lenders, including banks	Pawn-based loans for very short terms (commonly gold, other jewellery)
	Emergencies and sudden requirements	Savings-and-loan groups promoted by nonprofits	Loans by groups made with internal funds for short terms
Transfers	Regular expenses	Remittance companies, telecommunication companies	Money transfer services, mobile money, CCTs
Risk management	Emergencies and sudden requirements	Microlenders	Group-based life and funeral insurance policies added to microcredit

Note: Clients in this category have notable and varied sources of household income and are in a position to build credit histories. They may represent the best target for MFIs that want to expand into rural areas.

Financial service providers that lend to this segment mitigate risk primarily through diversification, spreading loans across many agroecological zones, crops and livestock, and markets, and by insisting that family incomes also be widely diversified.

deposit-taking MFIs may offer savings products suited to their needs and constraints. Agricultural banks or MFIs that have developed some specialized capacity in agriculture may be able to offer loans. Input suppliers who know them well may also extend credit on the basis of these relationships. These more formal sources of financial services could complement their participation in savings-and-loan groups.

**Gaps.** Though commercial smallholders in loose value chains have access to a relatively wider portfolio of

financial services than noncommercial smallholders, some financial products and approaches are incompatible with their crop mix and market linkages (e.g., contract farming).

### c. Financial portfolio of commercial smallholders in tight value chains

Producing higher-value cash crops and selling into tightly organized value chains, **approximately 35 million people would be considered commercial**

**smallholders in tight value chains**, and a total of roughly 175 million people live in these households. As relatively larger producers, they may hire people from the other two segments. They work with a range of value-chain actors that provide inputs, advice, and finance, and that then, if the stringent quality standards are met, purchase the final output. Though the households may derive significant income from these activities, they are also probably engaged in other agricultural activities for either home consumption or for sale into loosely organized value chains, as well as other nonagricultural activities.

These smallholders are more attractive customers for lenders, particularly as they become increasingly engaged in the production of high-end crops and livestock and enter production contracts with buyers. These households are the primary target of most specialized agricultural finance approaches, particularly related to contract farming, equipment leasing, and long-term loans for investments in tree crops, land preparation, or required agroprocessing infrastructure. That said, they also present a more complex risk profile than the other two segments (see Section 3d). Their income tends to be higher than households in the other segments, but it may also be more concentrated in less diversified agricultural production.

**Demand.** Commercial smallholders in tight value chains demand a more extensive suite of financial services than the other two segments. They look for a range of saving products to plan for medium-term expenditures, save regular income flows from nonfarming activities, make large purchases, and respond to emergencies. This segment also has a wider set of demands related to money transfers. In addition to receiving money from relatives or CCTs, as with the other two groups, these farming households may also want to send money to family members who rely on their regular support or who turn to them in emergencies, or to business contacts, such as input suppliers or employees, for payments. They could also receive transfers through these services, including payments for their crops from buyers. Commercial smallholders in tight value chains would demand a more complete range of risk

management products as well, including crop and livestock insurance.

**Supply.** This segment has access to the same suppliers of financial services as commercial smallholders in loose value chains, with some notable additions. Unlike the other two segments of farming households, these farmers may also be served by microlenders and credit unions that have developed the capacity to analyze individual credit risks, meaning that they no longer need to participate in group-lending approaches to access credit for large purchases or programmed expenses. In addition, commercial smallholders in tight value chains are more easily reached by insurers working through aggregating organizations (e.g., financial service providers, farmers organizations, value chain lead firms) to offer more complex forms of coverage, such as weather index-based insurance and area yield-based insurance, particularly as part of a package of other agricultural services. These are key differences, but the most important distinction is their use of contract farming and other value-chain financing instruments.

The characteristics of commercial smallholders in tight value chains present three fundamental challenges to financial services providers:

1. Their overall household income may come from relatively diverse sources, but some significant portion of their agricultural income may depend on one output and a single buyer.
2. Their contract farming agreements may on balance result in higher than normal risk, due to the exacting standards that outputs must meet to be sold under the contract.
3. The successful production methods related to the high-value crops grown under contract may be closely held and not widely available (unlike the well-known and relatively straightforward methods of growing staple crops), making it more challenging for financial service providers to evaluate household cash flows and risks.

Responding to these challenges, contract farming has successfully targeted this segment of smallholders. The capacity of commercial smallholders in tight value



**Table 4. Demand and (Potential) Supply of Formal Financial Services: Commercial Smallholders in Tight Value Chains**

Overarching category	Demand	Supply	
	Financial goal	Financial service provider	Product
<b>Savings</b>	Regular expenses: Pay for farming inputs at the right time	Banks, credit unions, licensed deposit-taking MFIs	Harvest savings account—depositing proceeds of sales for later, agreed use
	Investments, large purchases, or programmed expenses	Banks, credit unions, licensed deposit-taking MFIs	Passbook savings account into which family members can deposit daily and weekly income from nonfarming activities
	Emergencies, sudden requirements	Banks, credit unions, licensed deposit-taking MFIs	Passbook savings account
<b>Credit</b>	Regular expenses: Pay for farming inputs at the right time	Input suppliers	Supplies on credit if farmer has a long-standing relationship with an input supplier and is a steady producer
	Regular expenses: Pay for farming inputs at the right time	Purchasing agents along the value chain	Supplies on credit if farmer has a contract with a value-chain actor from whom they buy inputs and to whom they sell harvests
	Regular expenses: Pay for farming inputs at the right time	Microlenders with specialized capacity, agricultural banks	Agricultural production loans—tied to cash flow cycle, but maintaining general credit obligation for the household
	Investments, large purchases, or programmed expenses	Microlenders and credit unions that can analyze individual credit risks	Individual and solidarity group loans to farmers or family members engaged in productive off-farm activities
	Emergencies, sudden requirements	Microlenders and credit unions that can analyze individual credit risks	Individual and solidarity group loans to farmers or family members engaged in productive off-farm activities
<b>Transfers</b>	Regular expenses	Remittance companies, telecommunication companies	Money transfer services, mobile money, CCTs
	Regular expenses: Receive harvest payments and make payments to suppliers	Remittance companies, telecommunication companies	Money transfer services, mobile money, CCTs
<b>Risk management</b>	Emergencies, sudden requirements	MFIs	Group-based life, funeral, and weather index insurance policies added to microcredit
	Emergencies, sudden requirements	MFIs, agricultural loan providers	Group-based crop and livestock and weather index insurance policies added to agricultural loans

Note: The financial needs of this segment are the most complex. Clients in this category may earn substantial income through tightly organized value chains designed to both guarantee production success and payment for inputs, as well as from a number of other sources.

MFIs may be the primary providers of general finance to this category, since they may more fully understand the complete picture of household finances and offer a full suite of services. To work in the agricultural sector, they would have to build their skills and/or find knowledgeable partners. This leaves specialty production finance to the value-chain actors, which are better placed to and mitigate this risk through the production support bundles they provide.

chains to meet the high standards required for the both use of inputs (e.g., specific seeds, fertilizers) and production of outputs (e.g., unit size, total volume, quality) is higher than either of the other segments.

**Gaps.** Compared to the other two segments, commercial smallholders in tight value chains demand a wider range of formal financial services and are in a better position to interact with a

greater variety of service providers. Value-chain financing has an important, if narrow, role in their financial portfolio, and many other tools are needed to achieve the breadth of their household financial objectives.

#### **d. Benefits and limitations of value-chain finance for these three segments of agricultural households**

Notable improvements in access to finance for agricultural production have come from outside the field of financial inclusion, woven along the linkages of agricultural value chains. Traders and agricultural processors interested in increasing agricultural production and securing their supply lines recognized that farmers needed buyers to provide a bundle of inputs—such as fertilizer, improved seed varieties, agronomic advice, and the necessary financing to acquire everything at the beginning of the planting season—to produce the quantity and quality they wanted to purchase. The motivation of this “contract farming,” the most common of the value-chain finance approaches, was not necessarily to promote a more inclusive financial system, nor to reach more remote or less wealthy farmers, but to finance one specific agricultural output to secure the needed raw materials or export crops. Like other forms of value-chain finance—including forward contracts, warehouse receipts, input supplier and trader credit, factoring, and forfaiting—the motivation is to facilitate a transaction, a narrow, but entirely valid goal.

Using the segmentation framework in this analysis, value-chain finance tends to be largely irrelevant to **noncommercial smallholders**. In contract farming arrangements for high-value export crops, they would require extensive (and costly) support to meet the required quality standards. The large number of very small-scale farmers generating very small quantities of outputs would also present significant challenges and costs in coordinating, aggregating, and transporting their production for export or processing, even when working through aggregators (who would then need to assume these responsibilities and costs).

For **commercial smallholders in loose value chains**, some forms of value chain finance such as warehouse receipts could offer limited opportunities, if the volumes they wanted to store would warrant the transportation and other transaction costs. Contract farming, however, is usually not feasible with this segment. Commercial smallholders in loose value chains tend to focus on common, undifferentiated staple crops that are sold in a wide variety of markets. Many alternative buyers are present (as is the option of home consumption), which can result in side-selling: when farmers agree to sell to one buyer but then later choose to sell to a different buyer. Side-selling is a choice largely driven by the need for quick cash in hand, even if at a lower price than agreed with the intended buyer. This creates disruptions in supply for buyers and agricultural processors and can lead to an understandable lack of interest in working with smallholders at this level of production, especially when the needed supply of staple crops can be purchased relatively easily in informal markets and there is no need to cultivate a loyal supplier base of farmers.

**Commercial smallholders in tight value chains**, however, are the natural targets for highly structured value chain finance approaches, as they have the capacity and resources to grow high-value crops. These outputs are not consumed at home or sold as readily or even at all in local markets, due to their (1) structured sale by a government-managed marketing board (e.g., commodities such as coffee and cacao), though few of these remain; (2) need for further processing (e.g., cotton); and/or, (3) specific characteristics that differ from local tastes and preferences (e.g., processing potatoes grown for potato chips have a higher dry matter content and less sugar than table potatoes, making them less flavorful and less likely to be sold for everyday consumption). These characteristics make side-selling for these crops significantly less likely, which creates powerful incentives for buyers to develop longer-term relationships with producers.

Value-chain finance approaches such as contract farming can serve an important role in the financial

portfolio of commercial smallholders in tight value chains and achieve notable results—for one very specific agricultural activity. As would be expected, they are not engineered to address the much wider range of household goals and financial needs outlined above. These tools do not mobilize savings, open access to other forms or uses of credit, reduce nonagricultural household risks, or facilitate money transfers.<sup>19</sup> While value-chain financing has an important role, it is a narrow one, and many other financial tools are needed to achieve the wide range of household objectives in these households.

In addition, the presence of contract farming in a portfolio of financial services alters a household's overall risk profile. While contract farming can mitigate some risks and even has positive spillover effects on other agricultural activities,<sup>20</sup> it also presents some important challenges. First, it can be difficult to tease apart the various elements of a contract farming bundle and evaluate their individual price. The discrete costs of inputs, transportation, and credit are often unclear and cannot be compared to the standard market prices to evaluate the overall value of the arrangement. Second, power between buyers and farmers is usually uneven, and farmers can be exploited unless they are well-organized, prepared to negotiate, and have a certain level of business acumen. Third, and most important, unexpected and uncontrollable changes in conditions—weather shocks, illnesses, pest outbreaks, labor shortages, transportation delays—can prevent farmers from meeting the very precise quality and quantity terms of the contracts, and they would not get paid. Finding an alternative buyer may be impossible, even at a lower price, due to the specificities of the crop. Thus, with some risks mitigated and others intensified, commercial smallholders in tight value chains have a qualitatively different risk profile than the other two segments.

#### e. Selected opportunities: Products, delivery channels, and provider business models

Responding to the gaps between the demand from smallholder households and the supply from financial service providers outlined above, there are some promising opportunities that could improve the financial portfolios of smallholder families. While further analysis and experimentation are needed to better understand what agricultural households find useful in managing their financial lives, the following examples of products, delivery channels, and provider business models could suggest future directions relevant to the agricultural activities of the three segments identified in this paper.

In terms of products, **commitment savings accounts** modify standard savings accounts in simple, but very practical ways by limiting their accessibility and targeting their use. For example, the Save, Earn, Enjoy Deposits (SEED) accounts at Green Bank of Caraga, a rural bank in the Philippines, allow savers to restrict access to their own deposits until they reach a savings goal of their choice (e.g., target amount, specific date).<sup>21</sup> In agricultural households, commitment savings products can be used to set aside end-of-season profits to pay for the next season's input expenses. Opportunity International Bank in Malawi offers tobacco farmers commitment savings accounts to set aside profits from one harvest to fund the inputs (primarily fertilizer) for the next planting season.<sup>22</sup>

Restricted savings products allow farmers to use their own money to finance planting costs, thereby avoiding the interest expense and financial burden of a loan, as well as the transaction costs of engaging with financial service providers, input suppliers, and/or loan officers. Commitment savings accounts are also easy for clients to understand, and they

19 There are exceptions in which in-kind credit programs for cash crops facilitate finance for another agricultural activity (e.g., some rural bank lenders in Mali have used cotton contracts as security in lending for inputs related to noncotton crops, see Tefft [2010]), but these remain uncommon and are still limited, relative to the breadth of household objectives.

20 The positive spillover effects of contract farming on other noncontract crops, discussed in da Silva (2005), includes, for example, when the agronomic advice in the production bundle for the cash crop is also applicable to other crops (e.g., techniques to prevent soil erosion) or when the by-products of the cash crop can be used to benefit other crops (e.g., poultry manure as a soil enhancement, sugar beet leaves as animal feed).

21 See Ashraf, Karlan, and Yin (2006).

22 See Brune, Giné, Goldberg, and Yang (2010).

present a secure form of savings that cannot spoil, perish, or be stolen, unlike crops and livestock, and that is not vulnerable to demands from family (including spouses) and friends. There is also scope to tie additional features and services to these accounts, such as linkages to points of payment and direct deposit service. Payments from buyers could be deposited directly into the commitment savings account, with any amount over a level determined by the farmer spilling over into a standard savings account or a mobile money account. The size and infrequency of these transactions could also be profitable for financial service providers, especially those that have agency relationships with retailers or postal systems and that reach smaller, more remote towns and villages.

As a delivery channel, **mobile phones** are a powerful tool to reach vast numbers of clients with a range of information and simple financial services at lower cost. In agriculture, more and more services are delivered via mobile phone. Applications such as iCow and FarmPal (Wakoba 2012) direct specific, timely information on agricultural production methods to farmers through their mobile phone. The CocoaLink program (<http://worldcocoafoundation.org/cocoalink>)—initiated by the Ghana Cocoa Board, Hershey Company, and the World Cocoa Foundation—reaches cocoa farmers with free voice and SMS messages about improved farm practices, crop disease prevention, post-harvest handling, and marketing. Growers can also interact with the service to get answers to specific questions about cocoa farming (Reuters 2012). Moving beyond one-to-one communication, M-Farm (<http://mfarm.co.ke/marketplace>) is an Internet- and SMS-based service in Kenya that allows farmers to aggregate; it publishes wholesale price information on 42 crops and provides a platform for smallholders to collectively sell crops and buy inputs, thereby lowering costs and accessing new markets (Pisani 2011).

More financial transactions in agriculture are taking place via mobile phone as well. In Kenya, farmers can pay premiums and collect payouts from weather-based index insurance policies sold by UAP Insurance and the Syngenta Foundation, and can make “mobile layaway” payments for

Kickstart irrigation pumps through M-PESA, the mobile phone-based financial service (Mwangi 2012). MACE Foods, which manufactures and ships dried horticultural products to Europe, pays all its employees and farmer suppliers in Kenya through M-PESA. Making its payments through the mobile network has reduced fraud, theft, and administrative fees and has allowed it to track key statistical information about the farmers they work with (USAID 2012). In Zambia, Dunavant, a large cotton ginning company that finances and buys cotton from smallholders, uses a mobile payment system designed and piloted by Mobile Transactions Zambia Limited, with the support of USAID, to track and pay some of its farmers. This has reduced the time it takes to disburse payments, decreased side-selling, and allowed it to reward the best producers (USAID 2010a; USAID 2010b). These combinations of information and financial services, delivered through what is now a common household tool, can play a unique role in a household’s financial portfolio and overall livelihood strategy.

Finally, as a provider business model, the successful expansion of **MFIs into rural and agricultural areas** is blending the most promising features of traditional microfinance, contemporary agricultural finance, and standard financial services such as leasing. A number of common concepts underpin the approach, such as assessing a potential borrower’s ability to repay based on their overall household cash flows and not the potential success of one specific investment, delinking loan repayment from loan use, and enforcing repayment. Character-based lending techniques, as well as agricultural criteria that consider the feasibility of the proposed farming activity, are used to evaluate potential borrowers and set loan terms. Loan portfolios are also highly diversified, avoiding the concentration of risk in any sole region, market, crop, or livestock activity. PRODEM in Bolivia, for example, lends only to agricultural households that have additional off-farm income and that farm at least two crops (Christen and Pearce 2005). Most institutions limit their total exposure to agriculture to no more than one-third of their total lending portfolio and may also protect their loan portfolio with credit insurance, which covers the repayment

of an outstanding loan in case of default (Christen and Pearce 2005).

MFIs build their capacity in agricultural micro-finance by engaging local expertise in agriculture, either by training credit officers on the basics of the agricultural cycle or building credit teams that combine experts in crop science and animal husbandry with lending specialists. This helps create a sound portfolio of lending and contributes to the development of other complementary financial services. In Uganda, Centenary Rural Development Bank trained loan officers in agriculture and agribusiness to develop their understanding of farming as a business and promote better engagement with and monitoring of agricultural households they served, and in Thailand BAAC employs specialized agricultural credit staff throughout its branch network (Jessop et al. 2012).

Overall, for financial service providers in increasingly competitive markets, the business case to expand their products to smallholder households—serving both their general household needs as well as their agricultural ones—is getting stronger. The estimated 500 million smallholder farmers in low- and middle-income countries, arguably the largest single group of financially underserved people in the world, would find such services highly relevant.

## 4. Conclusions

In the financial portfolios of agricultural households, both general finance products and agricultural finance products play a role in meeting their overall objectives. General finance can cover most needs, including some related to everyday agricultural production. There seem to be relatively few instances—though important ones—in which dedicated financial products would be needed to address the particular risks and cash flows of agriculture:

- When agricultural households are relatively more dependent on farming for their total income and therefore face more extreme cyclical liquidity management problems.

- When larger investments over longer terms are needed.
- When the crop is relatively riskier.
- When production must be restarted following a catastrophic harvest.

From this perspective, financial service providers that specialize in understanding total household income flows could play a vital role in providing a wide spectrum of financial products to farming households. Financial service providers, such as MFIs, that are willing to develop some expertise in agriculture and that more closely identify the specific needs of farming households could play a pivotal role in facilitating a household's agricultural activities, as well as its other, more general financial goals. It may ultimately be more feasible for MFIs to learn about cash-flow cycles related to agricultural production than it would be for actors in the value chain to learn about nonfarm-related household incomes or to offer added savings opportunities or other financial services outside their area of expertise or beyond their natural interest.

Overall, it may be the case that most farming families need a portfolio of general finance all the time, and specific agricultural finance only as they engage more heavily in higher-value crops. In most cases, if they are growing staple crops for sale into loosely organized value chains, loans whose basic terms and conditions have been tailored to the agricultural cycle would be needed, and not much more. As their production includes more and more higher-value crops for sale on contract or other linked arrangements through tight value chains, their need for specialized financial tools would increase, and most of the financial tools needed for their agricultural activities would be embedded in the value chain itself.

In this segmentation framework, most value-chain finance instruments are relevant only to commercial smallholders in tight value chains. Contract farming, for example, can be a useful, even fundamental, complement to their overall portfolio of financial products. But for the agricultural activities of noncommercial smallholders and commercial smallholders in loosely organized value chains—which together represent the vast majority of poor,

farming households—value-chain finance tools are of limited utility, barring meaningful reductions in transaction costs and significant support for their “graduation” into more profitable agricultural activities.

Efforts to move at least some portion of farmers’ incomes into higher-value production are important, and the presence of financing mechanisms to support those higher-risk/higher-return crops is vital. But access to finance is still only a necessary—not sufficient—condition for improvements in agricultural production. As with every development challenge, the overall picture is complex and characterized by several interlinking elements. Parallel improvements are also needed in market infrastructure; farmer organizations and other intermediaries; input suppliers; and extension organizations, research bodies, and other sources

of innovation and information. Looking ahead, to meet the demand for financial products specific to smallholder agriculture, more information about farming families and their agricultural activities is needed. To improve supply, we need to more precisely define demand, and better understand how agricultural households differ, what is working and what is not in agricultural finance, and why that is. Refining the broad segmentation of agricultural households presented here, as well as encouraging increased transparency of the products and service providers already reaching them, are important steps toward answering these fundamental market questions. Illuminating the financial lives of these families could also help align general forms of finance with products tailored to their agricultural activities, and add greater value to the financial portfolios of the world’s 500 million smallholder households.

## Annex 1. Estimating the Size of the Three Segments

Estimates place the number of smallholder farms worldwide between 400 million and 500 million and the total number of people living in these households between 1.5 billion and 2.5 billion.<sup>23</sup> For simplicity, this paper uses the estimates that there are 500 million smallholders worldwide and 2.5 billion total people living in these households.

Within the segmentation framework presented here, an estimate of the population of each segment has been derived. Since no easily applicable global data exist, the analysis is guided by the relevant literature. As a first step, the estimate of the number of commercial smallholders in tight value chains was based on the findings in the World Bank RuralStruc data, which indicated that 7 percent of farmers in its sampled countries had production contracts with buyers (IFAD 2011b). Applied to the total of 500 million smallholders, this indicates that roughly 35 million smallholders would fall into this segment.<sup>24</sup>

The next step was to differentiate between noncommercial smallholders and commercial smallholders in loose value chains, which is not straightforward. Income measures alone are problematic, as discussed above, and no global datasets distinguish among the various forms of subsistence or smallholder farming. As such, until more precise data are available, this paper refers to Seville, Buxton, and Vorley (2011) and Jayne, Mather, and Mghenyi (2010) and estimates that 60 percent of smallholders could be considered subsistence farmers, as they grow primarily staple

crops, buy in food to supplement what they grow, and only occasionally sell surplus production into markets. Thus an estimated 300 million farmers would be considered in the noncommercial smallholder segment. By deduction, therefore, 165 million people would then be in the segment of commercial smallholders in loose value chains.

Then, to estimate the total population in these segments of smallholder households, literature on the average household size in low- and middle-income countries was consulted. Conway (2012) estimated the size of smallholder farming families to be five. Similarly Bongaarts (2001) found that the average size of the household in developing countries ranged from 4.8 to 5.6 people (averaging 5.2 people per household across regions) and showed little regional variation. Thus, for the sake of simplicity, the estimate of five people per smallholder household is used in this paper, which results in 1.5 billion people in noncommercial smallholder households, 825 million in commercial smallholder in loose value chain households, and 175 million people in commercial smallholder in tight value chain households. In total, these households account for roughly 2.5 billion people, or over 35 percent of the world's population.

Clearly these are only estimates and are intended largely to give a sense of the relative size of each segment and start a conversation about how agricultural households can be better differentiated and understood. As more specific data become available, they can be recalculated. Ideally, to clearly define market segments and precisely calculate their population size, more work is needed at the local and regional level.

<sup>23</sup> See Conway (2012); Hazell (2011); Hazel, Poulton, Wiggins, and Dorward (2007); IFAD (2011c); Nagayets (2005); and World Bank (2007).

<sup>24</sup> The World Bank coordinates a research effort on the "Structural Dimensions of Liberalisation in Agriculture and Rural Development" (i.e., RuralStruc) jointly with the French Cooperation and the International Fund for Agricultural Development. It focuses on seven countries in various stages of structural transformation and economic integration: Kenya, Madagascar, Mali, Mexico, Morocco, Nicaragua, and Senegal. For more information, see <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,contentMDK:21079721~pagePK:146736~piPK:146830~theSitePK:258644,00.html>

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