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Initial Drought Risk Finance Market Assessment for Jordan

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Al Shunah, Jordan (*photo*: Dr. Samir Barhoumeh)

Initial Drought Risk Finance Market Assessment for Jordan

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Acronyms and Abbreviations

ACC	Agricultural Credit Corporation
ARF	Agricultural Risk Fund
CBJ	Central Bank of Jordan
CBO	Community-based Organization
CDI/eCDI	Composite Drought Indicator/Enhanced Composite Drought Indicator
CRIF	Jordan Credit Bureau
DFS	Digital Financial Services
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoJ	Government of Jordan
Ha	Hectare
JLGC	Jordan Loan Guarantee Corporation
JOD	Jordanian Dinar
MFI	Microfinance Institution
MoA	Ministry of Agriculture
MSD	Market System Development
MWI	Ministry of Water and Irrigation
NARES	National Agricultural Research and Extension Systems
NDICO	National Drip Irrigation Company
NGO	Non-governmental organization
NPL	Non-Performing Loan
PSP	Payment Service Provider
RoI	Return on Investment
SLG	Savings and Loan Group
SME	Small and Medium-sized Enterprises
SWOT	Strengths, Weaknesses, Opportunities and Threats
USAID	United States Agency for International Development
WFP	World Food Programme
WIT	Water Innovation Technologies Project

Executive Summary

Assessment Purpose

In Jordan, droughts have significant social and economic impacts on vulnerable and marginal farming communities including smallholder producers of cereals on rainfed lands, livestock integrators and transhumant herders, as well as smallholder greenhouse farms and commercial agribusinesses. Farmers need access to affordable financial products to mitigate and proactively respond to episodes of drought.

The objectives of this initial system analysis of the drought risk finance market in Jordan, undertaken through the USAID-funded MENAdrought project, were to

1. assess agriculture and related finance sector actors and the legal and regulatory regimes prevalent in the financial markets so as to determine current systemic constraints and blockages; and
2. assess and advise on three appropriate and affordable financial risk management (mitigation and response) products customized to reduce the financial impacts of drought events.

Agricultural Finance Sector in Jordan

The agricultural finance sector in Jordan is made up of formal, semiformal and informal entities. However, formal financial service providers such as banks and microfinance institutions (MFIs) face major barriers to deep involvement in the agriculture sector. Farmers often are tenants rather than landowners and have only a limited understanding of formal accounting and finance sector requirements, and, therefore, difficulty obtaining official documentation to meet loan requirements. Other limitations are that banks tend to view the agriculture sector as small, volatile and risky without insurance products or loan guarantees; farms are rarely registered as businesses; and bankers generally do not understand agriculture sector dynamics and farmers' needs.

Due to these constraints, most farmers' credit and financial services—especially for smallholders—are provided by informal actors including wholesale market commissioners and agricultural input and hardware suppliers, as well as semiformal actors including savings and loan groups (SLGs) and community-based organizations (CBOs). This system serves short-term cash flow needs but does not support medium-term mitigation or long-term adaptation to increased droughts. Further, it has deleterious externalities including major volatility of input prices as a function of informal credit defaults.

Priority Groups for Drought-related Financial Risk Management Product Development

As part of this analysis, we prioritized, with the help of expert consultations, farming groups that can be targeted for drought financial risk management products. For this purpose, we used the following criteria:

- The significance of production and high exposure to drought risks (relevance);
- The likelihood of adoption by pioneer farmers (opportunity); and
- The likelihood of products being effective in risk management, and financially sustainable (feasibility).

The farming groups thus prioritized included:

- Smallholder cereal-livestock integrators and herders in Tafilah Governorate;
- Intensive hydroponic smallholders in Ramtha (Irbid Governorate);
- Medium and large commercial orchards in Mafraq Governorate;
- Greenhouse smallholders in Irbid (Northern Jordan Valley);
- Greenhouse smallholders in the Jordan Valley; and
- Small orchards and open-field vegetable farms in the Azraq Governorate.

Characteristics of Drought-related Financial Risk Management Products

The need for drought financial risk management products varies over multiple phases. During the preparatory phase, the need is for mitigation and risk reduction. The need for access to funding is not urgent in this phase; relatively smaller amounts of funding can significantly reduce future damage, both direct and indirect, from drought. Then, during a drought, there is a response phase in which funding needs can be urgent and timeliness is critical to reduce the overall impacts of drought. Finally, there is a recovery phase in which funding needs can be large, especially if there has been severe damage to physical assets and infrastructure.

Testing Potential Financial Risk Management Products. Based on an analysis of market needs and constraints, we developed five potential financial risk management products and tested them with both farmers and agriculture finance actors. We provided them information and assessed the feedback on the following aspects of these products:

- Timeliness, disbursal mechanism and available risk information (relevance);
- Risk responsibility, actor willingness and actor skills to implement (opportunity); and
- Cost, need for additional capacity building (offer-side as well as demand-side) and need for policy reforms (feasibility).

Products Proposed for Future Pilot Testing. We selected the following three drought financial risk management products for pilot testing in the future.

1. *Individual livestock Takaful index-based insurance.* This index-based Islamic insurance (Takaful) product is designed to protect individual sheep and goat herders and livestock-cereal integrators from drought-related mortality and productivity losses. Insurance holders cover a specific percentage of their registered flock (by number and weight). The price of insurance premiums is based on the location's drought hazard risk. Strike levels are determined through drought severity and coverage on the basis of the Composite Drought Indicator (CDI) scores. CDI scores are a proxy for pasture availability.

2. *Group mutual insurance.* This index-based insurance product is targeted for CBOs that organize growers of staple crops (cereals, pulses and olives) in the Irbid, Ajloun, Jerash, Balqa and Madaba governorates. CBOs would be covered by a group insurance plan that compensates the group for crop failure based on a response function of CDI and land cover at the locality level. Delivery of this product through semiformal financial institutions (CBOs) necessitates seed funding to develop the product, which could then be implemented by an insurance company or broker that undertakes the risk transfer.

3. *Smallholder-focused interseasonal agricultural loan*. This product is meant to facilitate farmers registered with the Agricultural Credit Corporation (ACC) and the Ministry of Agriculture (MoA) to access interseasonal loans to maintain and grow investments. Registered farmers will be eligible to access seasonal and zero-percent-interest loans (approved by the ACC) to bridge their income gap due to drought as assessed by the CDI score. Losses would be defined in Jordanian dinars (JOD) per dunam[1], and the loans would be aimed at supporting farmers in relaunching cropping activities in the season after a drought year. A donor or development agency will cover payments for services and interest servicing in the initial seven years of loan implementation. Rollout of the product would target drought hotspots (areas with higher drought hazard and vulnerability) and could be scaled to all the production basins of Jordan.

[1] 1 dunam = 0.1 hectare (ha).

1. Introduction

The ability of farmers to cope with and recover from drought is largely shaped by their assets, access to goods, services and capital, and their financial literacy. It is more efficient to mitigate risk[2] than to respond to impacts after they have occurred. Successful mitigation actions reduce the social and economic impacts of drought as well as the costs of response and dependence on relief efforts (Verner et al. 2018; Gerber and Mirzabaev 2017).

To be able to mitigate and proactively respond to drought episodes by adopting appropriate practices and technologies, farmers need access to affordable financial products (e.g., insurance, loan and credit options) that are designed to support them in making drought-conscious investment decisions.

We undertook an initial market system assessment of potentially sustainable finance products and other interventions for drought risk mitigation and impact response. Our approach was based on lessons learned from previous governance strengthening activities and Market System Development (MSD)-based approaches adopted in Jordan[3].

Market actors are driven by profitability. So we hypothesize that when well-informed 'pioneer farmers' (primarily those with technical and financial literacy) first adopt sustainable and customized technologies and practices, other early adopters will follow based on the principle of 'seeing is believing'. This scaling effect leverages market support functions, including proper embedded extension services and incentivizing legislation.

We synthesized learnings from past work and undertook policy reviews and market research, which involved key informant interviews and focus group discussions to evaluate the market dynamics of drought-related financial products. The overall objectives of our study were to:

1. assess agriculture and related finance sector actors and the legal and regulatory regimes prevalent in the financial markets so as to determine current systemic constraints and blockages; and

2. assess and advise on appropriate and affordable financial risk management (mitigation and response) products customized to reduce the financial impacts of drought events.

This assessment was undertaken through MENAdrought[4], a USAID-funded applied research-for-development project in Jordan, Lebanon and Morocco. MENAdrought aims to build the self-reliance of these countries in managing drought impacts on water and food security, and to limit the social and economic losses resulting from these events.

From the outset of the project, government and civil society stakeholders emphasized the need for financial risk mitigation mechanisms to improve drought management (McKee et al. 2020; Fragaszy et al. 2020; Jedd et al. 2020). Extensive drought impact and vulnerability studies conducted subsequently across Jordan (Fragaszy et al. 2022; Farajalla et al. 2022; Belhaj Fraj et al. 2022) provided us information on various types of drought-related risks faced by farmers and pastoralists. This narrowed the field of potential applications explored in this study, which then moved into the solutions space of identifying viable financial products to support drought mitigation and risk management.

In the rest of this section, we describe, with focus on financial and market issues, the drought risks experienced in Jordan and the broad challenges faced by its agriculture sector. The remainder of this report is structured as follows:

- **Section 2** provides an overview of the agricultural finance sector in Jordan in relation to offer-side actors and farmers' engagement with them;
- **Section 3** gives an assessment of prioritized demand-side actors;
- **Sections 4 and 5** deal with evaluation of potential drought risk management financial products from offer-side actors and then engagement with demand-side actors on potential products.
- **Section 6** presents the results of analysis of potential drought risk management financial products; and
- **Section 7** provides a summary of three financial products selected for pilot testing.

[2] The Jordanian Drought Action Plan (MWI 2022; Jobbins et al. 2022) defines drought mitigation actions as those to be implemented before drought events occur to reduce the impacts of drought on people, the economy and the environment.
[3] Especially the USAID-Mercy Corps Water Innovation Technologies (WIT) project, 2017-2022 (see https://www.mercycorps.org/research-resources/water-innovations-technologies-lessons-jordan), and background information from Dutch-funded work on agricultural market systems in Jordan (Palladium Europe BV 2019).
[4] For more on the MENAdrought project, see https://menadrought.iwmi.org/.

1.1 Problem Definition: Drought Risk Audit in Jordan

There is ample evidence of severe macro-, meso-, micro- and household-level impacts of drought in Jordan (Fragaszy et al. 2022). We evaluated the country's climatological drought history and associated agronomic effects using the enhanced CDI, which is now produced by the Ministry of Water and Irrigation (Bergaoui et al. 2022).

The results show that droughts classified as moderate (with a return period of 5 years and having reversible impacts) to severe (return period of 10 years and some irreversible impacts) occur discontinuously across space in the key agroecological zones of the northwestern Highlands-Jordan Valley and the arid areas of the *Badia* and the desert. Exceptional droughts (with a return period of 50 years) accentuate the chronic water deficit in the key aquifers of Yarmouk, Amman-Zarqa and Azraq.

Droughts affect rainfed as well as irrigated agricultural systems and pastoral activities, and severe and exceptional drought events affect food security because they lead to reduced production of staple crops (cereals, chickpea, lentils, fava beans and olives). They are also a threat to water security as higher atmospheric evaporative demand and heat stress lead to increased application of irrigation and associated groundwater pumping increases. This exacerbates the chronic water supply-demand deficit.

Droughts have significant social and economic impacts on vulnerable and marginal farming communities including smallholder cereal producers on rainfed lands, livestock integrators and transhumant herders as well as smallholder greenhouse farms and commercial agribusinesses. Although Jordan is a drought-prone country, dry events do not often occur simultaneously across all parts of these key agroecological zones. Exceptions to this general trend include the 2000-2001 season (estimated to be the driest in 500 years) and the 2007-2008 period when droughts were widespread.

Climatological drought risk hazard (Figure 1) in the food basket of Jordan (Highlands-Jordan Valley) is lower (29% likelihood of exceeding the national average) than in the Badia and desert zones (48% likelihood). As climatological risk varies substantially (65%) between them, these contrasting zones require different financial remediation products, and, ultimately, likely a different regime of bank guarantees and insurance premiums.

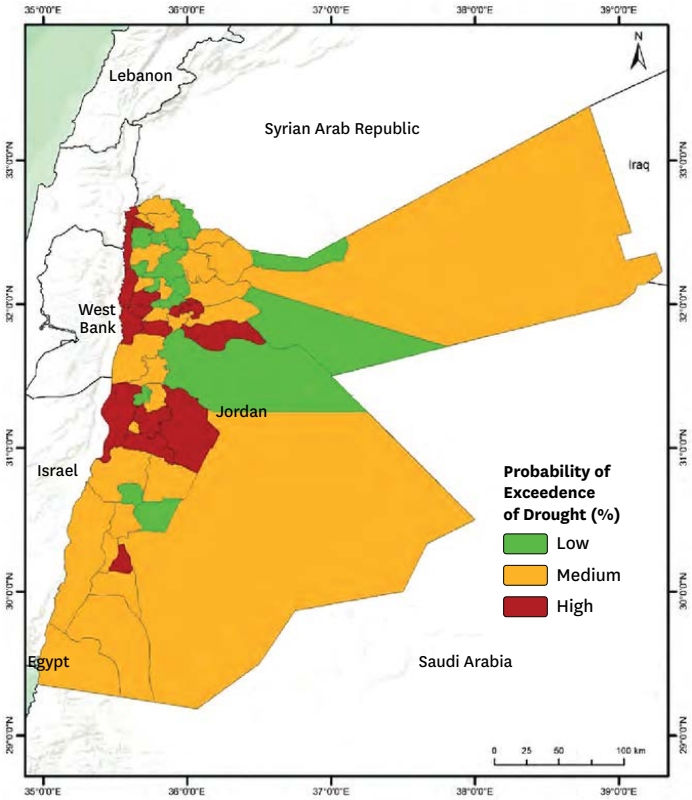

Figure 1. *The drought hazard map of Jordan. (Source: Fragaszy et al. 2022).*

Drought impacts undermine national progress on poverty reduction and adversely impact economic growth in the high-hazard rural areas (in Figure 1, the districts in red). The drought hazard map of Jordan shows that the Rift Valley mountain chain (running south to north on the western border) has high hazard. The Karak and Balqa governorates also have particularly high hazards, as do parts of the Zarqa, Jerash, Ma'an and Tafilah governorates. The eastern part of the northern highlands in Irbid, Ajloun and Jerash has a lower hazard, as do parts of Amman, Zarqa and Mafraq.

Our study focused on three regions of Jordan with very different agricultural characteristics:

1. The Azraq aquifer (characterized by groundwater-based, open-field commercial orchards and vegetable growing areas, including northeastern Mafraq);
2. The northwestern highlands and Jordan Valley (smallholder greenhouses in Irbid in the north and Ramtha in the central part of the Jordan Valley); and
3. Tafilah (CBOs of smallholder transhumant herders and cereal-livestock integrators in southwestern Jordan).

As an example of drought impacts in these regions, Tafilah has poverty pockets that have been severely impacted in recent years. The MENAdrought assessment of impacts during the period 2021-2022 (Belhaj Fraj et al. 2022) showed that smallholder farmers suffered directly (income losses) as well as indirectly (asset losses).

Directly, they faced production losses, especially of cereals, of up to approximately 50% due to extreme heat, water deficits, dust and pests. Indirectly, they were impacted through the gradual loss of assets (mainly small ruminant livestock mortality) and reduced investment capacity. Further, these indirect factors were exacerbated by significant inflation in the prices of agricultural inputs (fertilizer, energy and feedstuff) and hardware, which led to a decline in the incomes of poor families and increased indebtedness beyond the drought period.

CBOs reported that solidarity among their members—they support and help one another during times of drought—does alleviate drought impacts generally, but the capacity for resilience diminishes when droughts affect larger areas and assume greater severity, causing more widespread and deeper effects for all types of farmers.

1.2 Root Causes of Agricultural Underdevelopment

Our analysis of drought impacts indicated that there are underlying causes of vulnerability to drought-related financial impacts. To evaluate the wider aspects of agriculture sector vulnerability to drought impacts as well as general sectoral underdevelopment in Jordan, we synthesized past learnings from the Water Innovation and Technologies (WIT) and MENAdrought projects through root-cause analysis focusing on areas with high climatological drought hazards. Based on our expertise in agricultural market systems, we believe that farmers' business development requires:

- supportive government policy and regulation;
- enhancement of farmers' capabilities and ability to access finance for investment into viable business models; and
- access to stable and prosperous markets.

In general, it was found that low levels of trust between these farming communities and the Government of Jordan (GoJ) inhibit improved organization of the agriculture sector, information collection and application, and customization of the incentive and taxation regimes. For example, in relation to GoJ efforts to reduce rural poverty, farming typology data could be critical for developing pro-poor markets and tackling the root cause of poverty through sustainable financial models and dedicated literacy programs.

Further, it was found that agricultural extension services have struggled to enhance farmers' ability to achieve high levels of water valuation, productivity and profitability as well as increased access to stable and prosperous markets. Also, development projects supported by national and international agencies tend to work in silos and rarely consider 'inclusive businesses' to scale successful prototypes (see Accenture 2019).

In summary, actions to reduce the causes of vulnerability and underdevelopment require the following approaches:

1. *Reform of government policy and regulations.* Government policy and regulations do not at present enable management of the agricultural sector through interaction with local actors and decentralized interventions incorporating information feedback loops. Achieving macro-level water and food security is contingent on supporting rural economic prosperity and poverty alleviation, which also enhances social stability.

   Ameliorating this situation requires the government to prioritize protection of smallholder farmers' interests and the purchasing power of end-consumers. Our primary recommended systems-change interventions in this regard are to:

   a. gain the trust of farmers by integrating incentives into policies in order to support adhesion to overall national directives; and
   b. undertake farm registration to improve monitoring of farming systems and subsectors and targeting of interventions.

2. *Enhancement of farmers' financial and technical capacities.* This is needed in the areas of business accounting, quantitative risk management and uptake of techniques and technologies for mitigation of drought impacts. Customized financial and technical literacy programs focusing on climate-smart agriculture and finance need to be developed and promoted effectively; alongside this, there should be development of appropriate information-sharing mechanisms (i.e., those related to input and produce prices in the markets) so that farmers can apply their new knowledge in these themes.

3. *Development of inclusive, value-chain-integrated business model initiatives (inclusive of CBOs and aggregators—farmers, traders and processors).* Ultimately, this works to lower production and postharvest costs and to increase productivity, quality and added value. Involvement of traders and commissioners in financing farms and intermediation of transactions between farmers and wholesale markets could be formalized by integrating owners of capital into regulated investments in formal value chains. This could support traders' and commissioners' access, and smallholders' access, to financial institutions and promote wider adoption of agricultural water-use efficiency and conservation technologies and practices in drought-vulnerable zones. Ultimately, this outcome would reduce price volatility for local end-customers and promote export markets.

Market system-level interventions by the GoJ would work on the trade-off between the minimum purchase price for farmers to guarantee a stable income (and/or maximum sale price at the wholesale market) and incentives to attract traders and commissioners to formal investment models. In addition, digital communication and payment channels that bring together seller and buyer while cutting out excess middlemen could increase profits for smallholders and the purchasing power of consumers while incentivizing traders to explore more value-added agri-food industrialization and export markets.

Our analysis of the general underlying vulnerabilities and associated recommendations for systemic change are presented in full in Annex A.

2. Overview of Agricultural Finance Sector in Jordan

2.1 Offer-side Actors

The agricultural finance landscape in Jordan includes formal, semiformal and informal market actors (Table 1) as well as regulators, facilitators and ministries with remits related to drought risk management.

Table 1. *Classification of offer-side market actors.*

	Formal	Semiformal	Informal
Definition	Entities that supply financial products and services to commercial and individual customers, including commercial and Islamic banks, MFIs and various specialized financial institutions.	Legally registered entities that provide financial products to clients that are not subject to Central Bank of Jordan (CBJ) laws and regulations, including non-governmental organizations (NGOs), CBOs and SLGs.	Intermediaries (individuals or companies) that are not licensed to extend credit and are not regulated by monetary authorities. Intermediaries include commissioners, suppliers and moneylenders.
Registration and regulation	Entities are properly registered, licensed and supervised by the monetary authority, CBJ.	Entities are formally registered and supervised by the MoA. Their activities are often group-based.	Their credit operations are not regulated or supervised by any authority.
Agricultural producer clients	Medium and large farmers.	Households as well as subsistence and smallholder farmers.	All farmer categories except subsistence farmers.

2.1.1 Regulators, Facilitators and Ministries with Immediately Relevant Remits

The finance sector regulators and facilitators mandated in Jordan include the Central Bank of Jordan (CBJ), the Jordan Credit Bureau (CRIF), and the Jordan Loan Guarantee Corporation (JLGC). We provide additional information on these actors in Annex B.

The facilitators and ministries with remits including drought-related financial risk management mainly include the CBJ, Ministry of Water and Irrigation (MWI), MoA, Jordan Chamber of Commerce, Jordan Chamber of Industry and the Tax Department. However, as described in Section 1.2, these are not deeply involved in financial risk management at present, which leaves gaps in the range of products and incentives available for farmers to adopt drought mitigation practices and technologies.

2.1.2 Formal Agricultural Finance Actors

The agricultural finance market actors operating in the formal space include commercial banks, MFIs, leasing companies, exchange houses, payment service providers (PSPs), digital financial services (DFS) and mobile money digital financial services (MMDFS), insurance companies and GoJ compensation programs and agencies (including the ACC). However, they perform limited activities in agricultural finance and are particularly absent in the financing of smallholders.

2.1.3 Semiformal Market Actors

Semiformal market actors include CBOs and SLGs. There are over 800 CBOs active in Jordan, and they are generally considered the leading influencers in their respective local communities. Past experiences in promoting women- and youth-led businesses highlight the potential for community-based financing. CBOs are serious competitors to MFIs.

2.1.4 Informal Actors

Informal market actors include wholesale market commissioners, export contractors and input and hardware suppliers. Informal actors are by far the predominant source of agricultural finance in Jordan. Commissioners alone are estimated to provide 2 billion Jordanian dinars (JOD) of credit annually (Palladium Europe BV 2019).

We provide detailed descriptions of all offer-side agricultural finance market actors in Annex C.

2.2 Farmers' Engagement with Offer-side Actors: Rationale and Effects

Previous MSD investigations (USAID and Mercy Corps 2021) have shown that formal technical and financial advisory services and banking, financial, insurance and institutional support have been inactive in the agriculture sector. In contrast, informal finance through commissioners and suppliers was highly active. Figure 2 provides an overview of transactions within the agricultural value chain.

Formal financial service providers such as banks and MFIs need to acquire specific agricultural expertise to be able to assess the requirement for smallholder long-term investment loans (for adaptation purposes) and design appropriate financial products. Many banks lack this expertise or have difficulty acquiring it. Farmers' access to MFIs

and banks is limited for several reasons, including their lack of collateral, the high risk involved and the fact that smallholders rarely look for long-term investment funding, focusing instead on short-term funding for annual farm maintenance.

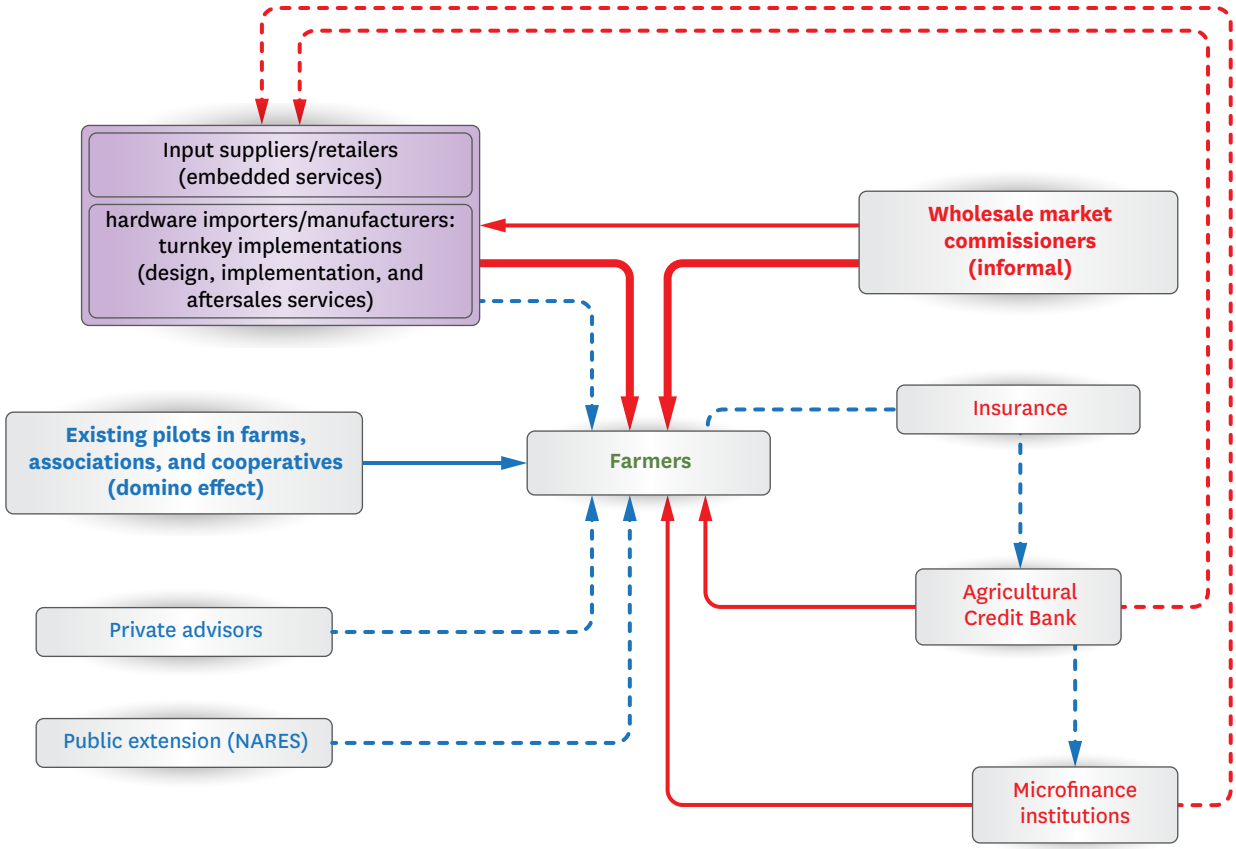

Figure 2. *The current pattern of extension (in blue) and financing (red) relationships within the agricultural value chain in Jordan. The thick lines indicate highly active relationships; the thinner lines depict moderately active relationships, and the dashes show inactive relationships. Note that suppliers (box in purple) serve both financing and extension purposes. (Source: Authors.)*

Given this gap, farmers rely mainly on commissioners, or arrange for deferred payments to local suppliers for inputs (including seeds), preferring to pay after the harvest, in order to prevent interruption of agricultural activities. While this system functions well enough to serve the need for short-term cash flow, it does not support medium-term mitigation or long-term adaptation to droughts. Figure 2 illustrates these formal versus informal dynamics, and Annex D provides a comparison of formal and informal market actors.

Due to these financial linkages between farmers, commissioners and input and equipment retailers, prices of inputs and equipment can increase significantly (up to 100%) during drought episodes, to offset loan defaults. This presents another challenge for rural communities and tends to decrease the viability of livelihoods (CBJ 2017), especially in hazard hotspots.

3. Assessment and Prioritization of Demand-side Market Actors

To serve the agriculture sector and its constituent businesses effectively, demand-side actors involved in drought risk-related financing should cover both the more vulnerable communities (mainly smallholder cereal producers and herders, smallholder greenhouse farms and women- and youth-led businesses) as well as commercial farms and agribusinesses.

We undertook a 3-part selection process to determine priority demand-side market actors, inclusive of agricultural production systems and geographic areas:

1. Criteria that reflect general principles;
2. Expert opinion to narrow down the target geographic areas and specific systems; and
3. Technical criteria to narrow down the specifics of agricultural production systems.

General Principles

Previous MSD implementation strategies prioritized demand-side actors based on the following general criteria:

Relevance (significance of production and high exposure to drought risk). According to drought risk audits (see Section 1.1), the Jordan Valley and the Azraq area have significant agricultural production, but farmers there also face exceptional and severe drought conditions. In Tafilah, priority farmers are those handling livestock.

Opportunity (likelihood of adoption by pioneer farmers). Drought risk financial remediation initiatives should target farmers who recognize the benefit of the business case for adopting drought mitigation and adaptation practices and technologies, including financial risk management mechanisms.

Feasibility (likelihood of products being effective in risk management, and financially sustainable). The availability of financial remediation tools for drought risks should address the issue of affordability while enabling business stability in coping with interyear constraints.

Expert Opinion

We discussed the selection of target farming groups and areas for intervention with experts from the International Water Management Institute, local influencers (our enumerators), community and municipality leaders, government officials from the regional agriculture directorates and farmers' association leaders who are familiar with commercial farming, agribusinesses (small- and medium-sized enterprises [SMEs]), and agri-food industry setups.

The target areas selected after this exercise were Azraq, western Mafraq, northern and middle Jordan Valley, and Tafilah in the south.

Technical Criteria

We further narrowed down the selection using the criteria shown in Table 2.

Table 2. *Targeting demand-side actors.*

Criteria for selection	Characteristics
Number of greenhouses and area	≤ 3 greenhouses Less than 35 dunam
Livestock number	One hundred heads of livestock
Resources	No access to formal banks and limited access to informal financing (limited resources [capital, skills, labor, risk, etc.])
Production	Production for self-sufficiency or commercial purposes
Marketing capacity	Limited capacity for marketing, storage and processing
Value chain	Often vulnerable in supply chains

Source: MoA data and Mercy Corps 2018.

3.1 Prioritized Demand-side Actors

Following this analysis, we prioritized demand-side actors from the following typologies:

- *Smallholder cereal-livestock integrators and herders in Tafilah*. The Tafilah Governorate is an arid area with an average rainfall of 240 mm per year, which can decrease by 50-70% during severe to exceptional droughts. Agriculture constitutes about 25% of its economic output. There are about 122,390 heads of sheep, goats and cows and 66 poultry farms in this area. Rainfed systems including rangelands cover 36,700 ha (cereals 37%) and irrigated cropping systems 640 ha (60% orchards).
- *Intensive hydroponic smallholders in Ramtha (Irbid Governorate)*. This is a water-scarce region with an average rainfall of 250 mm per year. Its primary crops include conventional and organic vegetables: onion, cucumber, lettuce, tomato and thyme, which are profitable crops of intermediate water value. Farmers reported that the cost of water is equivalent to about 1 US dollar (USD) per cubic meter. Since 2015, this high cost has pushed them to convert from open-field cultivation to protected hydroponic setups, which give higher yields primarily due to the absence of free soilborne pathogens.
- *Medium and large commercial orchards in Mafraq*. Mafraq receives an average rainfall of 150 mm per year[5] with an average of 49 days of precipitation. Initially, farmers in this region operated large commercial orchards and open-field vegetables (cabbage, onions, garlic and lettuce) encouraged by the availability of arable land and high quality of groundwater for year-round irrigation. The local climate is suitable for fruit trees (mainly stone fruit). Approximately 380 farmers own large commercial orchards over ca. 18,000 ha (including 3,146 ha of olive area). Production totals about 101,874 tons of fruit per year. Vegetables are grown on about 5,000 ha, mainly as open-field plantation during the spring season. Farm owners and managers from the southern Jordan Valley frequently lease farms and wells in Mafraq.
- *Greenhouse smallholders in Irbid in the northern Jordan Valley*. This governorate receives an average annual precipitation of 400-420 mm.[6] Fertile arable lands in this region are mainly located in glacis terraces with limited plot areas. Farmers optimize land use by operating highly productive greenhouses to grow potato, hot pepper, eggplant, melon and watermelon.
- *Greenhouse smallholders in the middle Jordan Valley—Deir Alla and South Shuna*. This area receives an average of about 225 mm of precipitation annually.[7] From the 1970s, farms here started converting from open-field cropping to protected agriculture in order to adapt to water scarcity. The region has 60,000 greenhouses presently, which are irrigated with blended water (surface water and secondary treated wastewater) supplied by the Jordan Valley Authority at a low tariff of JOD 0.011/m3, which does not recover costs.
- *Small orchards and open-field vegetable farms in Azraq*. This is an area with an average of only 60 mm of rainfall annually.[8] Prior to the drilling of numerous groundwater wells, Azraq used to have oasis farming systems. But in the 1970s, after about 430 farmers bought lands where groundwater was abundant, the oasis systems were converted into open-field orchards. Now olives cover about 1,700 ha, and vegetables and alfalfa about 2,700 ha. Other cropping systems include grape, pomegranate and pure-stand date palm plantations. The investors come mainly from Amman and Zarqa.

We provide additional detail on the targeted demand-side actors in Annex E.

4. Identifying Potential Drought Risk Management Financial Products

We explored potential financial products for drought risk management by

1. identifying, prioritizing and selecting five specific products that either (a) exist but are underperforming at present; or (b) do not exist at present due to lack of capacity, enabling environment, incentive and support systems, or due to constraints and blockages;
2. conducting a light-touch, qualitative market system analysis of demand and supply for each of these five products in relation to:
    a. how the market operates; how it has changed over time; and what/who is underperforming/not working;
    b. identifying constraints and blockages in the market system; and

[5] *Source:* Mafraq Agriculture Directorate, Ministry of Agriculture.
[6] *Source:* Irbid Agriculture Directorate, Ministry of Agriculture.
[7] *Source:* Jordan Valley Agriculture Directorate, Ministry of Agriculture.
[8] *Source:* Azraq Agriculture Directorate, Ministry of Agriculture.

c. assessing the root causes of these constraints and blockages, i.e., the need for policy, institutional and legislative reform; and

3. synthesizing these five case studies and selecting three products to act as a starting point for an intervention program using a market system approach for their development, including suggested next steps.

Our investigation followed four steps:

- **Step 1:** Verify that the market system(s) selected for further investigation remains valid;
- **Step 2:** Map the market system structure and understand its operation and dynamics to ascertain where it is adversely affecting the target group: With emphasis on poor people, identify how the system is not working for farmers.
- **Step 3:** Identify key system-level constraints (root causes) that prevent the market system from effectively serving the target group: Understand why the system is not working for the target group.
- **Step 4:** Decide which constraints are priority: Determine the point(s) where upcoming programs can focus their efforts to the greatest effect.

We worked within a general MSD model (Figure 3) in which the selected financial instruments are focused on addressing impacts on irrigated and rainfed agriculture (staple crops) and livestock, in addition to financing drought mitigation products for enhanced water productivity and conservation in areas with high exposure to drought.

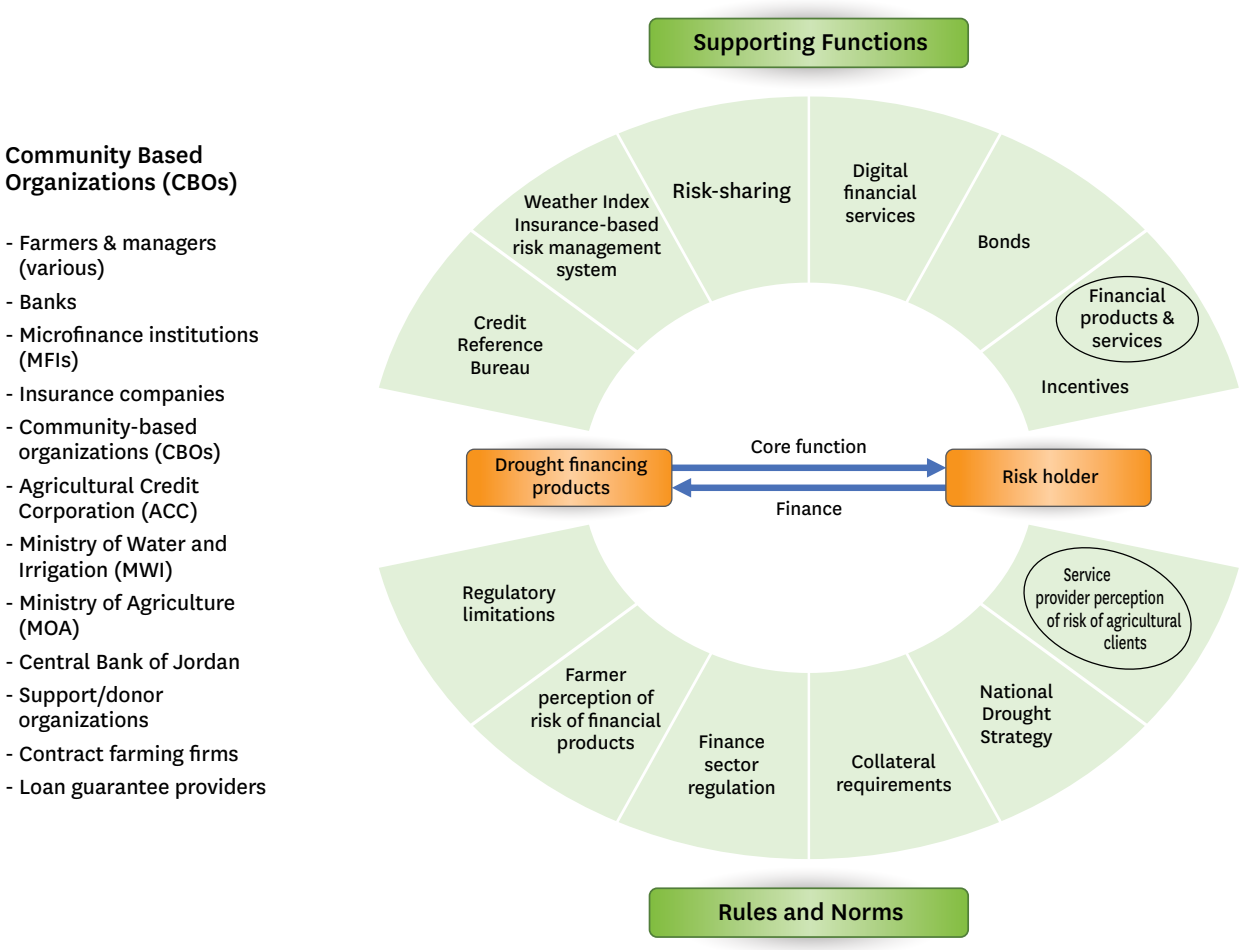

Figure 3. *Drought financing market system model. (Source: Authors.)*

We focused on determining the past and present general features of the market operation, identifying the actors' challenges and noting their opinions on underperforming services and the potential for uptake of drought risk management products. The products target both vulnerable groups and wealthier commercial farms.

We assessed market system capability by identifying market functions that need to work more efficiently and inclusively if the system is to benefit farmers, as well as identifying specific market actors who have the capacity and the incentive to perform those functions more effectively. This entails answering two sets of questions:

- Who 'does' what, and who will do what in the future?
- Who 'pays' for what, and who will pay for what in the future?

Subsequent sections respond to these questions.

4.1 Assessment of Offer-side and Supporting Actors and Potential Products: Methods

This component involved understanding the range of available and potential financial instruments, their strengths and weaknesses, and their applicability to drought risk reduction. We conducted 30- to 60-minute telephone and in-person interviews with 28 actors from the offer-side and in supporting functions (Table 3) and asked them the questions shown in Box 1.

Table 3. *Number of offer-side and supporting functions actors interviewed.*

#	Sector	Number
1	Microfinance institutions	3
2	Suppliers	3
3	Banks	2
4	Agricultural Credit Corporation	1
5	Ministry of Agriculture	1
6	National Agricultural Research Center	2
7	Insurance companies	3
8	Jordan Loan Guarantee Corporation	1
9	Ministry of Water and Irrigation	1
10	Central Bank of Jordan	1
11	Innovation actors (Dinarak)[9]	1
12	Commissioners	1
13	Leasing company	1
14	MoA Agricultural Risk Fund	1
15	Community-based organizations	6
Total		28

Box 1. Questionnaire for Offer-side and Supporting Function Actors

Business profile in agriculture

1. Do you currently have financing/compensation/relief products targeting the agricultural sector? If no: Please state the reason.
2. What are the main (agricultural projects at scale) that you have funded/supported?
3. How many applications for agricultural loans do you receive monthly? How many are approved?
4. What are the requirements to obtain an agricultural loan? (Key documents for application)
5. Do you have clients among input/hardware suppliers? If yes: Please mention some key deals.
6. Do you embed insurance into loan schemes to protect the agricultural investment from risks, whether environmental or financial? If yes: What is your insurance scope? And what are the conditions for enrolment?

Business challenges

7. What are the main challenges facing the agricultural sector?
8. What is the main issue drought is causing, and how can it be overcome?
9. Do you think farmers need training to manage their farms? If yes: Please specify.
10. Does the agricultural insurance option encourage farmers to invest?
11. How do you deal with cases of non-performing loans?

[9] Dinarak is a mobile payments provider.

Annex F provides more detail on the specific roles of our interviewees within their institutions.

4.2 Baseline Assessment of Offer-side and Supporting Actors and Potential Products: Results

4.2.1 Formal Market Actors

In our interviews, formal market actors pointed out several issues that limit agricultural financial product development, particularly in relation to loans. The major reasons they cited for their limited involvement in the agriculture sector were:

- Farmers are more often tenants rather than landowners.
- There are difficulties in obtaining proper financial information or the required loan documentation from farmers.
- Market size is perceived to be small.
- Agricultural finance is a volatile sector with considerable risk; there are no insurance products to mitigate risk.
- Farmers have a limited understanding of the formal finance sector; and formal financial sector actors have a limited understanding of agriculture sector dynamics and farmers' needs.
- The CBJ stipulates that financial products for businesses should only be provided to registered businesses; however, most farms are not registered as companies.
- The JLGC does not guarantee agricultural loans.

ACC

The facts that limit the ACC from expanding its loan offerings are:

- Limited availability of funding, coupled with low collection rates, hinders ACC's ability to grant new loans or large loans.
- It is highly dependent on collateral because there are no third-party loan guarantees or agriculture insurance available in Jordan.
- There is weak understanding of agricultural technologies and drought mitigation products in particular (e.g., water-saving technologies).

MFIs

Our interviews with MFI actors brought out some common issues hindering agricultural lending. Figure 4 summarizes these major obstacles (presented as the steps of a pyramid). The foremost obstacle cited was the elevated risk inherent in the agriculture sector. This is the first concern of all financial institutions. The other obstacles are related to farmers: black-listed farmers (for loan defaults), low cash flow, lack of mortgage and the wide variety of activities that fall within the ambit of agriculture, which is perceived as dispersed focus.

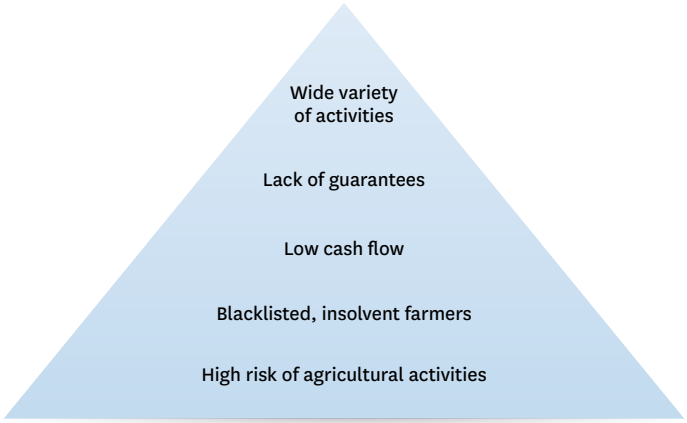

Figure 4. *Limitations hindering agricultural sector loans. (Source: Authors.)*

Our MFI interviewees made several suggestions to improve agricultural funding (Figure 5). The first suggestion was to improve farmers' knowledge of financial issues so that they would know the requirements they have to fulfil to get loans.

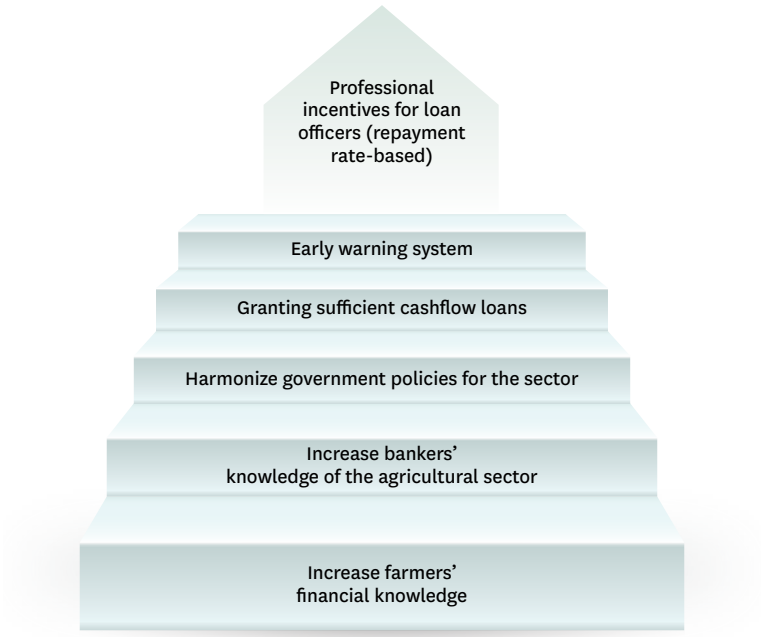

Figure 5. *Suggestions to improve agricultural funding. (Source: Authors.)*

However, at the same time, the bankers' own low awareness of the agriculture sector also hinders lending to investors in the sector. Further, our MFI interviewees complained about the lack of clarity in government directives on lending to the agriculture sector (especially smallholders). Another reason cited was that farmers' income instability deeply affects the cash flow and profits of farmers. Moreover, there are no drought early warning systems to help farmers adapt their farm management systems during a drought event. Also, there are no incentives for loan officers based on repayment results.

4.2.2 Semiformal Market Actors

CBOs

All the CBOs we interviewed stated that access to finance is a key challenge they face when introducing new products and services into the market. However, some of them did have positive experiences in managing revolving loans from different donors.

CBOs are potential development partners who could serve as the primary mechanism for community outreach on financial services. They can also set up SLGs under their umbrella. For example, the Jordan River Foundation implemented, with donor funding, the Jordan Valley Links Project (2019-2020).

In the future, working on access to finance will be a very important role for CBOs. Beyond access to finance, they also have the potential to help farmers aggregate for price negotiations on input and hardware prices based on the suppliers' confidence in the group rather than dealing with individual clients.

Unfortunately, it is difficult to assess the business case for risk management financial products as there is a lack of information on crop and farm budgets to benchmark the performance of farming systems and identify potential areas for income improvement. Such data would ease the process of loan assessment as financial service providers would then be able to make an impartial assessment of the business model and its performance.

The offer-side market actors we interviewed gave a range of other suggestions:

- The financial products developed for the agriculture sector should leverage digital financial services and savings products for MFIs.
- The CRIF should discuss with suppliers and the ACC the root causes of outstanding credit and design financial products to prevent further indebtedness of farmers.
- As part of its financial inclusion agenda, the CBJ should give incentives to encourage smaller ticket sizes (e.g., credit to purchase small equipment) to enable banks and MFIs to reach smaller farmers, either directly or indirectly. It should also design mechanisms to deal with non-payment risks.
- The JLGC or a new financial vehicle could offer guarantees for smaller agricultural loans. That would facilitate cash flow lending and decrease dependence on collateral. For long-term sustainability of any offering, considering the capability of local institutions, it was recommended that they work through the JLGC to improve their offerings.

We provide a SWOT (strengths-weaknesses-opportunities-threats) analysis of banks, MFIs and ACC in relation to agricultural finance products aimed particularly at smallholders in Annex G.

SLGs

Financial product deployment can also be done through SLGs by way of revolving loans, whereby a donor agency funds a CBO, which transforms it into a community MFI after training on due diligence. Loan repayment rates should be low (for example, JOD 20-50 per month, inclusive of service charges), and repayment could extend to a maximum of 5 years. Therefore, non-performing loan levels would tend toward 2%, which would encourage proliferation of SLGs.

For an SLG to act as a vehicle for microloans, its group members should receive training on group formation, rules and regulations, and savings and lending practices. The members save every week—in some cases monthly—into a group fund. As the group fund grows, members can draw loans for various reasons ranging from household needs to business purposes. As a result, the SLG members experience a significant improvement in household health and wellbeing, and an improved quality of life overall, as well as enhanced social well-being due to the formation of important levels of social capital within the group[10].

The revolving loans concept allows the financial service provider to repay and withdraw loans any number of times until the arrangement is completed. Annex H includes a SWOT analysis of SLGs as a channel for deployment of financial products. We recommend SLGs as a good institutional vehicle for financial product deployment to smallholder farmers.

4.2.3 Informal Market Actors

Commissioners

The existing commissioner financing system has many inefficiencies. Farmers said the severe power imbalance in dealing with market commissioners was a major problem. On the other hand, commissioners expressed dissatisfaction about delayed payments from farmers due to various risky conditions. They said there is considerable risk involved in giving credit, particularly delayed repayment.

Given their market power and relevance, we recommend commissioners for financing small- and medium-sized farms under the condition that their financial activities are integrated into the formal system.

Hardware and Input Suppliers

USAID's AgBee report (D'Angelo and Quinn 2012) showed that 85% of Jordanian suppliers' business is based on credit. About 19% of hardware and input suppliers have credit facilities at the Development Employment Fund or local banks to cover their capital needs (working capital and inventory). All the suppliers we interviewed declared that without

[10] See, for example, CARE Uganda's work on Village Savings and Loans Associations (VSLA; https://www.care-international.org/what-we-do/womens-economic-justice/village-savings-and-loans-associations.

informal credit plans or donor aid, smallholder farmers would not be able to afford any type of investments[11]. Further, in times of prolonged drought, suppliers need to be supported with financial products and lending to sustain their business.

Input suppliers. In the case of input suppliers, 90% of their sales of seeds, fertilizer and pesticides to farmers are on credit and only 10% in cash. The maximum credit period offered is 9 months; repayments begin only after the crop harvest is completed. Suppliers reported that on an average about 20% of the credit is repaid late, or not at all. This pattern began at the start of the civil war in neighboring Syria with farmers increasingly struggling to pay back their debts, which led to them using fewer inputs and subsequently suffering an overall decline in farm income. Many small suppliers have not been able to cope with this situation and have gone bankrupt, unlike larger dealers who can manage repayment volatility.

Hardware suppliers. The business of hardware suppliers consists of selling greenhouses, irrigation systems and machinery to farmers and receiving payments in multiple tranches spread over one to two years. On an average, 35% of the sales are repaid extremely late, or not at all. This happens despite manufacturers lowering prices significantly due to the economic downturn since the beginning of the Syrian war. Several suppliers seek credit facilities from banks to finance import of irrigation spare parts. If bank credit is not sufficient, they tend to limit their lending to farmers in order to maintain their cash flow. In this case, suppliers claim post-dated checks issued 3-12 months in advance.

Even large farm owners who have the means for at least partial cash payment prefer to use informal credit. The price for cash purchases is 10% lower than for credit, with the minimum down payment ranging from 20% to 50%, as described below. Suppliers play a vital role in the agriculture value chain, not only as suppliers of irrigation technologies and inputs but also as a source of finance for farmers as well.

In their role as informal financiers, suppliers differentiate three types of clients:

- **'Trustworthy' recurring clients:** These are clients with a creditworthy history of making payments through commissioners, who make exclusive arrangements with them at a gross market rate in which interest and taxes (maximum of 20%) are embedded. Commissioners who own farms also benefit from this relationship with suppliers and get cheaper products. If the farmer has a bank account, commissioners mainly accept guarantee certificates or in some cases post-dated checks for the merchandise value. Commissioners face substantial risk, which justifies the high interest rate.
- **Known clients[12]:** These are clients recommended by recurring and trustworthy clients. They are required to make only a 20% down payment instead of 50%.
- **Unknown clients:** These are smallholder farmers who are new to the business, often young and women farmers. Being new, they are not familiar to suppliers and so have to be recommended by other trustworthy clients. They are required to make upfront payments up to 50% of the purchase price and the rest in tranches, as done by other clients. There are no formal tripartite agreements in place. With unknown farmers, suppliers sometimes insist on collateral such as post-dated checks and mortgage of vehicles. Lands are not mortgaged as small farmers are usually not landowners.

All payments by farmers are open to rescheduling in the eventuality of drought or frost. Suppliers conduct background checks on clients with other farmers, commissioners and suppliers. If the farmer does not meet the supplier's specific conditions and no deal can be made, the farmer still must pay back the prefinanced amount. This often leaves the farmer indebted to suppliers.

Suppliers are generally more comfortable with the status quo of supplying conventional hardware and are hesitant to grow their business into innovative technology (e.g., hydroponics). This is partially due to general economic concerns related to a challenging export market caused by the collapse of traditional routes (to Eastern Europe via Syria and Turkey). To maintain hydroponic businesses, a few suppliers like the National Drip Irrigation Company (NDICO) are expanding their market portfolio by catering to new farmers. Informal channels of finance find favor with farmers, who said they prefer to borrow directly from suppliers rather than banks.

In Table 4, we synthesize the views expressed by informal offer-side market actors on the advantages and disadvantages of their involvement in agricultural lending. Further, in Annex I, we document the challenges faced by these offer-side actors, and the potential changes needed to ameliorate the problems.

[11] Mercy Corps (2018).
[12] Known clients can become recurrent clients after building a good credit record over three or four seasons.

Table 4. *Advantages and disadvantages of informal agriculture sector finance, according to offer-side actors.*

Advantages	Disadvantages
Adaptable to changing needs in the sector	Prone to delinquency and fraud
Simple and easy to access	Limited ability to lend
Trusted and unintimidating	Unreliable and lacks privacy
Flexibility in repayments	Inefficient allocation of capital

4.3 Potential Drought Risk Finance Products

We decided that it would be useful to structure our consideration of financial products according to the timing of their application, as follows:

- *Preparatory phase (mitigation and risk reduction).* In this stage, the need to access funding is not urgent, but small amounts of funding can significantly reduce future direct and indirect damage due to drought.
- *Response phase.* In this stage, funding is urgently needed to limit the overall impact of an ongoing drought. Timeliness of fund delivery is therefore critical.
- *Recovery phase.* Funding needs during this stage can be large, especially if there has been severe damage to physical assets and infrastructure.

In Table 5, we categorize specific instruments in relation to their use in these three phases of drought risk management, and show the relevant offer-side actors who can play a role in agriculture finance.

Table 5. *Drought financing instruments and their implementation timing.*

Category	Instrument	Market actors	When funding is needed
Risk reduction	Loans	MFIs, ACC	Preparation and recovery
	Revolving loans	CBOs	Preparation and recovery
	Microcredit	SLGs	Preparation and recovery
Risk retention	Reserve funds	MoA, donors	Response and recovery
Risk transfer	Loan guarantee	Donors, suppliers, financial institutions	Response and recovery
	Micro-insurance	CBOs, SLGs	Response and recovery
	Mutual group insurance	CBOs, insurance companies	Response and recovery
	Islamic insurance (Takaful)	CBOs, insurance companies	Response and recovery

Based on our knowledge of farming systems and constraints, drought impacts and vulnerabilities in Jordan, and findings from our interviews, we selected the following products to test with farmers in focus groups (see Section 5). In those focus groups, we explored the instrument packages, their potential for financial inclusion through digital services, and additional services such as vocational education and training, and other insurance products (e.g., vehicles, assets, life/health insurance and retirement plans).

4.3.1 Individual Livestock Takaful Index-based Insurance (Risk Transfer)

There are 3.8 million head of livestock (sheep, goats and cows) in Jordan[13] with 122,390 in the Tafilah Governorate[14]. Drought affects livestock productivity, mortality and fertility and thus impacts livestock integrators' and herders' income. This financial product provides insurance to address the livestock production and revenue risks associated with drought.

[13] *Source:* Jordan Department of Statistics website (DoS 2021).
[14] *Source:* Jordan Department of Statistics website.

We consider that Islamic insurance (*Takaful*) has greater social acceptance in Jordan than conventional insurance. We present more information on *Takaful* insurance, including a comparison with conventional insurance, in Annex J. With this product, the risk borne by livestock integrators and herders is insured. A donor agency provides seed funding to an insurance company to develop this product. The insurance company then pools funds from the gathered annual premium payments, which vary according to location—the hazard level defining the insurance index—and the insured flock's size and productivity.

4.3.2 Group Crop Mutual Insurance (Group Insurance/Risk Transfer)

For vulnerable producers of cereals and staple crops who might be severely affected by drought, we suggest community-level insurance. This calls for donor support to involve an insurance company/broker to work with the MoA and a CGIAR knowledge partner to develop mutual insurance for locality-level CBOs that are officially registered with the MoA.

The insurance company operates this as a risk-transfer response-and-recovery solution for individual CBOs rather than individual farmers. Each subscribing CBO pays an annual fee premium (based on the hazard level) and the area covered under insurance. Each CBO collects the annual fees from its farmer members and manages the distribution of pay-outs to farmers.

The CBOs act very much like partner-agents by maintaining a database of the beneficiaries, their locations and crop details. This financial model could be an opportunity for the CBOs to use their organizing ability and negotiating power to secure low prices for agricultural inputs.

4.3.3 Microfinance Technology Investment Credits for Women- and Youth-led Businesses (Risk Reduction)

Through MFIs and women- and youth-led businesses, farmers can afford to implement drought adaptation practices such as water conservation technologies. We suggest working with an MFI to design a loan scheme for farmers to invest in drought mitigation products, including both low-cost and fully designed irrigation systems and complementary automation units and fertigation systems, and full hydroponic systems.

The loan instrument will focus on strengthening farmers' resilience by financing them to procure hardware and inputs from suppliers at a preferential price. There will be no collateral needed in line with microfinance practice; however, collateral involves the harvested produce itself. The financing tenure will be 2-5 years with payment terms defined season-wise.

4.3.4 Medium Landholder-focused, Seasonal, One-go Loan Portfolio Guarantee with Suppliers (Risk Transfer)

This mechanism aims to reduce seasonal cashflow risks and close the ability gaps that hinder medium-sized farmers operating under conditions of high interyear climate variability. This product is initially funded by a donor who confidentially arranges (without the farmer's knowledge) with hardware/input suppliers to design one-go loans that are guaranteed using the donor seed money without any bank interference. The seasonal loan portfolio guarantee will eventually recover bad debts as they occur. The sustainability of this product can be supported by linking farmers more directly into value chains (e.g., the agri-food industry).

4.3.5 Smallholder-focused, Interseasonal, Zero-percent-interest Loans (Risk Reduction and Transfer)

The farmers entitled to this scheme are smallholders with less than 20 dunams of orchard- and vegetable-growing land, with a maximum of three greenhouses. Farmers registered/licensed by the GoJ would be eligible for this product. They can access seasonal, zero-percent-interest loans based on a drought index approved by the ACC to launch

cropping activities in the next growing season. The average income gap (loss to be defined in terms of JoD per dunam grown) is loaned to farmers (at a zero percent interest rate) to fund activities in the next growing season. A donor/ development agency will cover the payment for services and interest for the initial 7 years of the loan implementation.

5. Evaluation of Potential Financial Products with Farmers' Participation

5.1 Methods

Based on our priorities regarding actors and selection criteria, we undertook semistructured interviews and focus group discussions with participants from six farming groups (Table 6). We presented to them information on the five potential financial products that we had selected for testing, feeding into the process to pick three of them to recommend for pilot development in future. Selection of interview participants was done so as to ensure broad representation of demand-side market actors.

Table 6. *Focus group discussions with demand-side actors.*

Area/region	Farmer groups	Selection criteria
Tafilah	Smallholder cereal-livestock integrators and herders*	≤ 100 heads of livestock
Ramtha	Intensive hydroponic smallholders*	≤ 3 houses
Mafraq	Medium and large commercial orchards	5-19.9 ha
Irbid	Intensive greenhouse smallholders*	≤ 3 houses
Jordan Valley	Greenhouse smallholders*	≤ 3 houses
Azraq	Small orchards and open-field vegetable farms*	≤ 5 ha

**Note:* Mixed subsistence and commercial farming. Selection criteria sourced from MoA data and Belhaj Fraj (2018).

Specific participants were selected to ensure a broad representation amongst demand-side market actors. A total of 55 people (with 9% of them women) participated in the interviews (Figure 6).

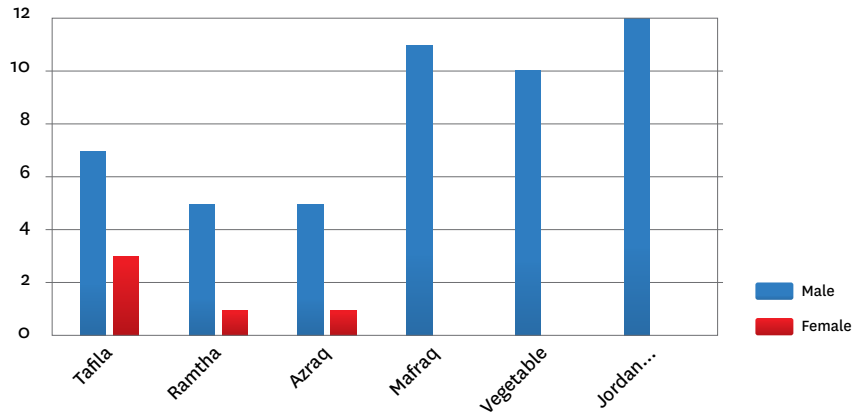

Figure 6. *Interviewees in the regions of intervention. (Source: Authors).*

The semistructured interviews and focus group discussions focused on determining the participants'

1. specific production system including farm type, land tenure, intermediate consumption and aggregation within communities;

2. perception of drought severity and impact;
3. actual status of access to finance;
4. general opinion about drought financial remediation offers and offer-side actors including the GoJ; and
5. three preferred financial products from among the five we initially selected.

The specific questions put to the interviewees are listed in Box 2. The questions were followed by an open discussion on the selection of three drought risk finance products, particularly their relevance, key opportunities and feasibility.

Box 2. Questionnaire for Demand-side Actors

Production System-level Information

1. What is the area of your farm, status of tenure, year of establishment, cropping/production system (livestock integration or produce semitransformation) and market?
2. What are your main and external/secondary sources of income?
3. Are there animal production farms in your area and do you benefit from manure? Is it purchased or free?
4. Are there agricultural cooperative societies or non-profit associations in your region? If yes, specify.

Perceptions of Drought

5. In your area, how many years were dry out of the past 5 years? Which ones?
6. What are the major drought impacts you suffer from and how do you manage irrigation during dry years?

Opinion on Drought Risk Financial Remediation Offer-side Actors

7. Do you benefit from government support during dry years? From which entity? What kind of support? Are you aware of the Agricultural Risk Fund (ARF)?
8. Are there agricultural lending agencies, Islamic and/or commercial banks, MFIs, insurance branches, suppliers, commissioners or others in your region? If yes, mention their names and describe the services you benefit from.
9. To access finance, which financial institution did/would you deal with?
10. What kind of insurance do you prefer? Governmental, Islamic, *Takaful*, or private?

5.2 Results of Engagement with Farmers

Here we provide summary comments on the results of our engagement with farmers. Their comments informed numerous aspects of our analysis, including the selection and analysis of three financial products we present in Sections 6 and 7, the additional detail on priority actors contained in Annex E, and the SWOT analyses in Annexes G and H.

General Pattern of Access to Finance

In our focus group discussions in Tafilah and Ramtha, farmers confirmed benefiting from the GoJ's *Takaful program*[15]. This is a government cash assistance program launched in 2020 that in some ways harks back to the historical crisis relief funds implemented during the period 1985-2005 (see Annex C).

We found that our respondents' primary source of loans is the ACC, and their most preferred channel of borrowing is Islamic financing. The local branch of the ACC is the sole formal agricultural lending entity in these governorates, with commercial and Islamic banks operating only in the commercial and personal loan space (e.g., for housing). Farmers were not aware of the new Agricultural Risk Fund. The situation is similar in Azraq and Mafraq.

In the Jordan Valley, Islamic, GoJ and private banks do provide general insurance services (but not agricultural insurance) with a market share of about 50%, 40% and 10%, respectively. As for agricultural lending, NGOs' actions for access to finance are limited to punctual support of MFIs in integrating vulnerable communities into value-chains (such as the dried tomato project managed by Mercy Corps for women-led businesses in Mafraq).

Farmers' Views on Agricultural Finance Support

Farmers consider it imperative for drought-related financial support to come in the form of zero-interest-rate loans or as grants toward financial compensation. Participants noted that cooperative societies and social networks have

[15] See *Takaful* (2020).

always supported farmers when they faced severe economic hardship. Such social networks serve as a channel for economic and social support.

All our interviewees confirmed that there are no insurance schemes available specifically for drought risk. If an opportunity for such insurance arose in future, they prefer Islamic *Takaful* insurance.

Overall, farmers were not familiar with general financial instruments. The lack of specific legislation and policies to enhance financial inclusion of farmers and farming communities indicates the need for greater emphasis by GoJ on improving this situation.

5.3 Synthesis of Findings from Engagement with Offer- and Demand-side Actors

The limited financial means of small- and medium-sized landholders and the reluctance of financial institutions to lend to them are crucial factors that constrain farmers' participation in higher-value export and urban market channels. Table 7 summarizes some suggested instrument categories to leverage financing linkages.

For banks, smallholder farmers are a client segment that could expand and become a driver of growth. We recommend that donor support should move beyond guarantee funds and demand-side technical assistance toward support for investment capital and technical assistance for financial institutions and farmers through Farmer Innovation Funds, like those provided to suppliers under the USAID-Mercy Corps WIT Project.

Table 7. *Instruments to leverage financing linkages.*

Category	Instrument
Risk mitigation products	Insurance
Financial enhancements	Loan guarantees
Grant programs	Farmer Innovation Funds

Financial linkages between formal, semiformal and informal actors in agricultural finance are limited in Jordan. However, they can grow if the CBJ plays a facilitation role, and if banks are willing to expand their skillsets and sectoral coverage.

Still, the formal financial sector is unlikely to be able to help the most vulnerable smallholder farmers' resilience to drought for reasons outlined in Annexes D and I, primarily due to procedural requirements, collateral requirements, repayment schedules, interest rates and its own limited knowledge of the farmers' business environment.

These gaps can be addressed by the informal financial sector, which, however, requires training by the formal financial sector on record-keeping, support in maintaining a stable volume of loanable funds, and provision of access to donor funds. Annex I outlines the main offer-side constraints hindering banks, MFIs and other financial service providers in serving smallholder farmers suitably and sustainably. It highlights the root cause of financial service providers' inability to serve agriculture sector clients' needs, and suggests concrete systemic changes to meet those needs.

Apart from these constraints, there are two other challenges for which targeted interventions could make a significant difference:

1. Currently, farmers do not have formally registered businesses, which hinders interventions targeted for them.
2. There are inefficiencies in the way the local market is organized. It would be beneficial to make them more transparent. This could be undertaken through a market information initiative by international donors.

The most promising way to address the gap in agricultural finance is for the CBJ and MoA to collaborate, with technical assistance from applied researchers such as those from CGIAR, to:

- Build on existing relationships (products, information and services) and start with a clear understanding of all actors in the agriculture sector, including financial institutions (in all grades of formality) that are either current or potential providers of financial services.
- Recognize the importance of long-term financial intermediation and understand the policy implications of interventions.
- Consider agricultural finance by typology of value chain and access to market in order to determine the best products and their implementation method.

6. Selection of Products for Further Development

6.1 Criteria and Process for Selection of Financial Remediation Products

We assessed five drought risk remediation financial instruments (Table 8) using a traffic-light color scoring system on three criteria: Relevance (time, disbursal mechanism, risk information); opportunity (risk responsibility and actors' willingness and skills); and feasibility (costs and need for capacity building and supporting policies). This analysis is based on our engagement with both offer- and demand-side actors.

In more detail, we assessed:

- **Time:** Both in terms of the speed of implementation of the instrument *(how long it would take for funds to be made available)* and the timing of implementation *(at what point during the response process will those funds be needed, depending on whether they are for relief and emergency response, recovery or longer-term reconstruction)*.
- **Disbursal mechanisms:** The disbursal process should be clearly defined, efficient and transparent so as to promote trust in the financiers and accountability in the use of funds.
- **Risk information:** There must be a clear understanding of the climate hazard, the levels of strike and of asset exposure, and the vulnerability status of different segments of the population. Gender considerations and the needs of vulnerable groups must be fully accounted for in the risk assessment.
- **Risk responsibility:** For governments, risk ownership involves establishing a clear understanding of potential direct losses, contingent liabilities, guarantees and potential changes in the macroeconomic environment because of an event. If a stakeholder has a limited risk-bearing capacity, the ultimate responsibility may fall on other stakeholders.
- **Cost:** The opportunity costs that may make disaster risk financing politically and fiscally challenging.

We compared the five selected products in relation to potential offer-side actors' capacity, as well as wider constraints and blockages. In our analysis, we also present suggestions on ways to support product delivery, possible incentive and support systems, and ways to address constraints and blockages.

After selection, the products were validated and refined through a second round of individual discussions with key potential offerors and farmers' representatives. In these meetings, we discussed the three financial instruments finalized according to a business model template using information shown in Table 8 and described in Section 7. The market system for each product was presented in a visual chart, with elements describing their core functions, key interventions, value configurations, market actors, value proposition and supporting functions. We also presented the general elements of the product sustainability framework and the intervention strategy.

6.2 Comparison of Financial Products

In Table 8, we describe and compare five financial products using the criteria described above and rank them in Table 9.

Table 8. *Comparison of financial products in terms of target, category, risk-holder, purpose, timing, risk level and market actors.*

Instrument	Region/ target	Category	Risk holder	Purpose	Timing	Risk level	Market actors
Individual livestock Takaful index-based insurance	Livestock integrators and herders in Tafilah and other similar regions of the Badia and desert region	Risk transfer	Insurance company (donor seed money)	Primarily to reduce risk to livestock productivity, fertility and flock size	Response and recovery	Most cost-effective when used to respond to low-frequency, high-intensity events	Insurance companies, digital payments providers, MoA and finance sector regulators, potential donors (World Food Programme [WFP], International Fund for Agricultural Development [IFAD], USAID)
Group crop mutual insurance	All smallholder farmers in staple crop production areas	Risk transfer group insurance	CBOs (donor seed fund)	Primarily to reduce risk of yield reduction or crop failure due to drought conditions (water deficit and heat stress)	Response and recovery	Most cost-effective when used to respond to low-frequency, high-intensity events	CBOs, donors, MoA and finance sector regulators
Microfinance technology investment credits for women- and youth-led businesses	Women-led and youth-led businesses in all locations	Risk reduction	MFIs (farmers)	Primarily to reduce risk to physical assets but can also be used to reduce risk to lives and livelihoods	Preparedness activities plus recovery	Most effective at reducing risk from frequent (annual or up to 1 in 10-year) events	MFIs, CBJ, suppliers
Medium landholder-focused, seasonal, one-go, loan portfolio guarantee by supplier(s)	All medium-sized holders in all locations	Risk transfer	Confidential arrangement between donors and suppliers	Primarily to promote vulnerable farmers' businesses (women and youth)	Preparedness activities plus recovery	Most effective at reducing risk	Donors, MoA and finance sector regulators
Smallholder-focused, interseasonal, zero-percent-interest loans	Smallholder farmers: orchards, open-field vegetables and greenhouses	Risk reduction and transfer	ACC and seed money from donors	Primarily to reduce risk to physical assets but can also be used to reduce risk to livelihoods	Preparedness activities plus recovery	Most effective at reducing risk from severe to exceptional droughts	ACC, CBJ, MoA, MWI (international banks and agricultural development funds)

Table 9. *Evaluation* of financial instruments.*

Criteria	Modality	Individual livestock Takaful index-based insurance	Group crop mutual insurance	Microfinance technology investment credits for women- and youth-led businesses	Medium landholder-focused, seasonal, one-go, loan portfolio guarantee by supplier(s)	Smallholder-focused, interseasonal, zero-percent-interest loans
Relevance	Time	High	High	Medium	Medium	Medium
	Disbursal mechanism	High	Low	Medium	Low	High
	Risk information	Low	Low	Low	Low	Low
Opportunity	Risk responsibility	High	High	Low	Low	High
	Actor willingness	High	Medium	Low	Low	High
	Actor skills	Low	Low	Low	Low	High
Feasibility	Cost	High	Medium	Low	Low	High
	Need for capacity building	Low	Low	Low	Low	High
	Need for policies	Low	Low	High	Low	High

**Note:*
High: High potential for implementation in the market system.
Medium: Moderate potential for implementation in the market system.
Low: Limited potential for implementation in the market system.

Based on this assessment, the three instruments we recommend are:

- Individual livestock Takaful index-based insurance
- Group crop mutual insurance
- Smallholder-focused interseasonal agricultural loan

7. Selected Financial Products for Future Development

7.1 Individual Livestock Takaful Index-based Insurance

This risk-transfer index-based Islamic insurance product for livestock is designed to protect individual sheep and goat livestock integrators and herders from drought-related productivity (animal weight) losses and mortality. Each livestock holder subscribes to the insurance plan to cover his or her registered flock (number and weight) at a percentage of coverage and pays a graded annual fee according to his or her ability to pay.

A donor agency in collaboration with a knowledge partner (such as CGIAR) and the MoA develops the pricing for the insurance product based on the drought hazard in Jordan. Drought severity and coverage are assessed using a CDI as proxy for pasture availability to define the strike-level areas for payouts. Triggers are based on the correlation between CDI scores and livestock productivity and mortality[16]. Secondary statistics determine insurance pay-out ceilings for each affected region, which in turn could be adjusted by private field experts who are certified and supervised by the MoA.

Strike premium-dependent pay-outs are managed using a DFS insurance management system, which is also used by farmers for insurance subscription through an e-wallet that manages all insurance transactions and database collation, including uploading drought impact photos in the mobile application. Pay-out timing is contractually agreed with farmers according to the livestock growth and development cycle to ensure stability in flock size and productivity.

The e-wallet could include other features like the creation of a savings account. The DFS could include a free-of-charge credit card that can be used by livestock holders to pay for veterinary services, receive GoJ subsidies and compensation, or subscribe to other social services (e.g., social security, retirement plans, health/life insurance). The full financial product thus enables the financial inclusion of a significant portion of non-bankable farmers.

This formal financial product embedded in the DFS system allows for quick claims settlement and supports the MoA's biyearly census and audits as well as related measurement of food security indicators. Technical and financial capacity building tutorials are embedded in the DFS which could also be used to advertise veterinary companies, animal health and nutrition advisory services, vaccination and input suppliers (drugs, feed supplements).

7.2 Group Mutual Insurance (Risk Transfer)

Staple crop (cereals, pulses and olives) growers in Irbid, Ajloun, Jerash, Balqa and Madaba governorates significantly contribute to Jordan's national food security. However, they most frequently grow crops under rainfed conditions. They have low financial resilience as they rarely integrate livestock at a scale necessary to help them weather drought years. However, when aggregated into CBOs, these farmers can benefit from a group insurance plan that compensates them for crop failure based on a response function of the CDI and land cover at the locality level.

The delivery of this proposed financial product through semiformal financial institutions necessitates a donor's seed fund to develop a product that could be implemented by an insurance company or broker. The insurance company operates for risk transfer.

[16] See Bergaoui et al. (2022) for an example of this type of trigger threshold development in relation to the enhanced CDI developed through the MENAdrought project.

Each subscribing CBO pays an annual fee premium based on the hazard and/or exposure level, and the area covered under insurance. Each CBO collects the annual fees from its farmer members and manages the distribution of pay-outs to them. The insurance pay-out is based on the premium considered for each CBO location and the drought strike level (eCDI-based trigger that is related to crop failure) for each location.

The insurance company works with the MoA, the donor and its technical arm (the knowledge partner from CGIAR) to define premiums and set up drought triggers for insurance pay-outs. Once the model is set up, individual contracts with the CBOs are developed, and insurance subscription and pay-outs can be managed using a DFS that could have additional services (similar to the Takaful DFS described above).

Management of risk at the meso-level through mutual insurance aggregates exposure and risk through CBOs at the locality or regional level, which enables easier and more effective systemic risk management than with individual subscribers. Each CBO formally purchases insurance and is the policyholder that is responsible for paying premiums, receiving pay-outs and distributing them to its subscriber members. The insurance company portfolio should include a significant number of subscribed CBOs in the five staple food basket governorates mentioned above.

When the insurance system is set up at a critical mass, it enables hundreds of smallholders to be sustainably protected from drought impacts indirectly under meso-level policy to the risk collector (CBO). The CBOs act very much like a partner agent by maintaining databases on the beneficiaries, their locations and crop details. Basis-risk is usually less problematic in large, capitalized risk aggregators than for individual smallholders. Also, ultimately, the CBO risk aggregator can act on behalf of large numbers of small resource-poor farmers in group negotiating and purchasing of agricultural inputs from suppliers.

7.3 Smallholder-focused Interseasonal Agricultural Loan

Smallholders with irrigated farms struggle to increase their investments due to their limited landholding, capital and assets. Open-field infrastructure usually covers less than 20 dunams of orchard and vegetable area, with a maximum of 3 greenhouses. Irrigation water shortages due to severe drought reduce farm income and damage cash flow and assets, which prevents smallholders from relaunching agricultural activities after drought termination.

We suggest a formal financial product for ACC- and MoA-registered farmers to access interseasonal loans to maintain and grow investments. However, interest rates of loan reimbursement are constraining investments as they constitute a significant part of the return on investments (almost half of the RoI).

The financial product we suggest works so that eligible registered farmers will, based on a drought index, access seasonal zero-percent-interest loans approved by ACC to relaunch their cropping activities in the following growing season. The average income gap (loss defined in JOD per dunam grown) is then loaned at a 0% interest rate to fund activities in the following growing season. A donor or development agency will cover the payment of services and interest rates for the initial 7 years of loan implementation.

Loan volumes and repayment amounts and periods should be designed to be affordable to individual farmers and to enable them to invest in maintenance of high-efficiency irrigation and fertilizer application technologies. The GoJ and donors are looking to boost economic activities among smallholders who are the majority both in terms of water usage and in contribution to national food security.

Investments will be targeted at hotspots (areas of drought hazard and highest impacts) and could be scaled to the production basins of Jordan. The investment loans should be designed to be used primarily for investing in water technologies and drought mitigation products. They can also target increasing the level of mechanization of farms.

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Annex A. Root Causes of Agricultural Sector Challenges

The challenges impacting the business dynamics and productivity of the agricultural sector in Jordan include biophysical, technical, legislative, economic and financial, and marketing constraints.

- *Biophysical constraints.* These constraints stem from limited arable land and fragmented holdings, harsh climate impacting farmers' incomes, and limited and degraded water and natural resources.
- *Technical constraints.* There is low adoption of modern on-farm irrigation technologies and practices (data-driven irrigation scheduling, climate-smart practices, soil and water conservation practices, postharvest storage, etc.). This is due to weak public extension services, low farmer engagement with the wider private sector, and overall low on-farm mechanization.
  Most of the participants (See Section 5.2) indicated that they lacked knowledge of drought mitigation technology such as drought-tolerant crops and varieties that could be grown in these regions during prolonged droughts. They had never tried new crops and varieties because they were not ready to depart from established practices. For example, most orchard growers limited themselves to growing stone and seed fruits because that was what their parents used to do. Farmers refused to adopt high water value crops such as almond, pistachio, cashew and saffron as advised by extension staff.
  We believe that extension services cannot advise farmers on changing cropping patterns without pilot projects or without offering a full package of integration into a solid value chain. Adoption of alternative cropping systems requires a strong extension service that should be delivered by the private sector for reasons of financial sustainability.
- *Legislative constraints.* Agricultural and financial sector policy and regulation do not incentivize farmers to contribute to the national water and food security strategies. For example, an official farm activity registry could help the government direct subsidies as well as monitor water productivity and overall agricultural production.
  In addition, the agriculture sector makes only a limited contribution to national employment and poverty alleviation efforts as low wages in agriculture are not attractive to the Jordanian labor force. Despite regulatory limitations on issuing work permits, and increasing work permit fees, the sector is still 75% dependent on foreign labor. Regulations should be adapted to attract Jordanian labor, for example, by subsidizing social services and controlling labor wages.
- *Economic and financial constraints.* These constraints are related to market price volatility, the lack of insurance products and loan guarantee programs, and limited formal finance.
- *Marketing constraints.* These constraints include weak internal marketing limited to the wholesale markets of touvenant products (low-grade produce), reduced access to typical trade and export routes to Iraq and Syria due to regional instability, and decreased export to Gulf Cooperation Council (GCC) countries and Europe because of low adherence to international market standards, for example, in relation to chemical residues.

These factors impact farm productivity and quality, which results in an overall decline in farmers' and herders' incomes, particularly during droughts.

Economic empowerment of farmers should include access to finance both during the course, and outside of, drought episodes. Further, financial offers need to be customized to include working capital and equipment financing, equity financing, tenure, grace periods, interest rates, collateral requirement, management strategies and other requirements including business registration, plans and credit history.

The root causes of low access to finance in the agriculture sector of Jordan reside in defaults, on both the offer and demand sides. There is a lack of understanding of the needs of the client base, and therefore of the full spectrum of financial products required to match those needs. In addition, government regulations and legislation do not provide specific incentives for economic inclusion of farmers. This results in financial institutions failing to develop a strategic interest in the farmer client base.

Additional information is shown in Table A1.

Table A1. *Root causes and recommended systemic changes to address agriculture sector challenges.*

Issue	Constraints	Root cause	Recommended systemic change
Government policy and regulation	Informal businesses and low regulation prevent quality governance and centralized interventions.	Most farms are not required to be registered. This limits understanding of farm typologies, which inhibits improved market organization: • Farmers perceive registration of their business as a risk that may lead to government taxation and restrictions on access to water. • There are no incentives for registration such as subsidies, technical advisory, access to finance (aid, compensation, calamity funds, credit rescheduling, or tax or tariff reduction).	• Activate MoA registration for livestock farmers and horticultural farms. • Strengthen MoA capacity in developing control measures and incentives for sector organization, monitoring, evaluation and coordination.
	No smallholder-focused policies	• The GoJ does prioritize macro-interventions for poverty alleviation, food security and social stability but the key to solving these challenges is to support smallholders' access to markets and finance.	• Work on market strategies and sustainable economic development is the key to poverty alleviation and food security. • Codevelop a dedicated market strategy program with a detailed action plan to reduce the influence of special interests compared to farmers and final customers with the objective of reducing price volatility and postharvest losses. • Encourage commissioners to invest in formal value chains and provide access to finance entities.
	Little or no financial support	• There are few, if any, sources of government-subsidized financing available to farmers to support entrepreneurial activities and market formation for agri/horticultural goods.	• Implement projects to finance entrepreneurial activities and develop the market for water conservation/saving technologies and practices.
Farmer capacity and knowledge	Low business accounting skills	• Farmers are not aware of the importance of accounting. • They spend time on on-farm physical activities and off-farm procurement but too little on farm financial management.	• Develop financial literacy capacity development programs including on-farm and crop budgeting training. • Certify accounting-trained farms' eligibility for cashflow lending and insurance plans offered by financial institutions. • Incentivize farmers to share data with GoJ (see root cause in relation to farm registration shown above).
	No risk management tools	• Farmers are weak in quantitative risk assessment for prudent decision-making.	• Leverage ongoing efforts to set up an agricultural market information system (e.g., by MoA and the Netherlands Government). • Provide training on evaluating risk-averse strategies using time-series cost/attribution analyses for key production inputs (energy, spare parts, inputs, etc.) • Develop information systems for production and price risk management. Examples include collecting and distributing weather, climate and market/price data throughout the value chain. These are largely absent from the sector now. • Develop and support uptake of customized financial risk management products.
	Low innovation and low productivity	• Limited resilience to weather hazards like drought. Traditional farming behavior and lack of awareness of the latest technological developments and best agriculture practices. • New technologies are perceived to be costly and requiring access to a source of finance.	• Provide access to information and technical advisories on best-farming technologies and practices, and proven solutions. • Provide access to customized financial services for climate-smart agriculture development projects.
Access to finance	Limited access to financial services (farmers turn to informal credit from traders and suppliers)	• High production and market risks result in volatile, generally low farm incomes and limited savings or collateral.	• Increase farmers' capacities, and provide the information needed to utilize them, to boost productivity and quality, and sustainably conserve land and water resources.
Business models	Lack of inclusive business models	• There is no involvement of smallholders in inclusive business models run by successful aggregators, traders and processors. Minimal integration into high-quality value chains, as the only quality parameter is the water content of fruits and vegetables.	• Develop projects (e.g., supported by WFP, Food and Agriculture Organization and GIZ[17])
	High production and processing costs	• High input supply costs of seeds, water, fertilizer, pesticides and irrigation hardware and machinery. • High costs of postharvest handling (grading, sorting, storage) and a shortage of refrigerator trucks and storage facilities.	• Many development partners, including USAID, GIZ and the Netherlands Embassy have made water management and other issues an investment priority. • There is an investment need for CBO-hosted postharvest facilities for small farmers.

[17] See Elebrashi et al. (2018).

Issue	Constraints	Root cause	Recommended systemic change
Markets	Farm produce price volatility causes problems related to credit repayment to suppliers, middlemen, traders and/or commissioners.	• Smallholders sell farm produce for low prices—as for a raw commodity. • Closed border with Syria during the civil war (2012-2017). • Decrease in commodity prices due to variations in land border flows since October 2018 (exports down by 70% compared to pre-war situation). • Lack of coordination and contract farming. • Overproduction of some crops (such as tomatoes) due to lack of farmer coordination. • Most sales transactions result from informal business linkages without formal contracts. • Middlemen, acting as intermediaries with the wholesale market, significantly reduce the earnings of smallholders. Large growers sell directly to wholesale markets.	• Establish a minimum purchase price from farmers and/or a maximum price in the wholesale markets. • Support export market organization for large- and medium-scale farmers. • Conduct pilot projects of interventions focusing on different market structures and contracting models; select the most effective transaction models to scale up. • Support uptake of digital communication and payment channels to bring together seller and buyer and cut out one or more middlemen. • Support agricultural extension services to focus on non-financial factors of production such as marketing and improved quantity, quality and consistency of produce in order to facilitate access to higher quality and value markets.

Annex B. Financial Sector Regulators and Facilitators

The CBJ, the main regulator of the financial sector in Jordan, is tasked with maintaining monetary and financial stability. It also has the goal of promoting sustained economic growth and social development. To support this goal, it has a specialized unit that functions as a wholesale lending facility for banks and MFIs.

The CBJ makes funding available at low interest rates for lending to the agriculture sector. However, there are no mechanisms in place to favor smaller ticket sizes and to deal with the higher risk present in the agriculture sector. As part of its financial inclusion agenda, the CBJ should evaluate how it can put in place incentives to encourage smaller ticket sizes to enable banks and MFIs to reach smaller farmers (directly or indirectly) as well as look into mechanisms to deal with the additional risks present in the agriculture sector.

CRIF is a private-owned credit bureau that aims to boost lending to SMEs. All the banks in Jordan and four MFIs to date are now affiliated to CRIF. The CBJ is making efforts to ensure that all financial sector players, including PSPs, become part of CRIF as soon as possible. The PSPs could leverage data from CRIF to develop credit products for their customers. Zain Telecom signed an agreement with CRIF in September 2019 for this purpose.

The JLGC guarantees loans for SMEs with 5-250 employees in the industrial and services sector, including food processing activities, but does not guarantee agricultural loans. Data from 2015 values the JLGC portfolio at JOD 67.8 million, with loans to more than 3,500 borrowers.

Annex C. Offer-side Market Actors

In this section, we present brief descriptions of offer-side market actors (Table C1) as defined in previous MSD-oriented investigations. The subsections below provide additional detail on formal, semiformal and informal market actors.

Table C1. *Brief descriptions of offer-side market actors.*

Market actor	Status*	Description
Central Bank of Jordan (CBJ)	F	This regulatory entity is responsible for all formal financing institutions and monetary policy.
Income & Sales Tax Department	F	This authority provides tax services and promotes voluntary compliance by taxpayers.
Jordan Chamber of Commerce (JCC); Jordan Chamber of Industry (JCI)	F	• JCC represents the general interests of the business community. It provides market information and economic statistics and advice to members to promote economic development, encourage foreign investment and facilitate international trade. • JCI is a national umbrella body of all chambers of industry in Jordan, representing their interests and working to enhance cooperation and coordination among them.
Commercial banks	F	A total of 23 formally registered financing institutions operate in Jordan, licensed by the CBJ, chartered by the government, and subject to banking regulations and supervision. They provide commercial financial products to corporations and individuals.
Agricultural Credit Corporation	F	This publicly funded entity is mandated to contribute to comprehensive agricultural and rural development by providing financial services to the agricultural sector, including through an array of commercial and subsidized lending instruments.
Islamic banks	F	These are 4 formally registered financing institutions licensed by the CBJ, chartered by the government, and subject to banking regulations and supervision. They provide financial products based on Islamic economic rules to corporations and individuals.
MFIs	F	A total of 9 formally registered MFIs are licensed by the CBJ to give loans to low-income people.
CBOs	SF	These are civil society organizations operating within a local community. They are often established through donor and/or government initiatives.
Commissioners	INF	There are approximately 200 wholesalers of fruits, vegetables and olives across Jordan. They also act as flexible sources of informal lending, often linked to sales agreements; they also facilitate deals with inputs/hardware suppliers and retailers.
Suppliers of agricultural hardware/inputs	INF	These are businesses that sell hardware/inputs including high/low-cost drought mitigation or adaptation products.
Hardware/inputs retailers	INF	These are individuals or small businesses that sell hardware/inputs—often low-cost and in relatively small quantities—including drought mitigation or adaptation products to farmers.

**Note:* F = Formal; SF = Semiformal; INF = Informal.

C1. Additional Detail on Formal Market Actors

Commercial banks. Commercial banks in Jordan include 23 banks, whose lending to the private sector—the larger, well-established firms—amounts to almost 33% of their deposits. In addition, there are four dedicated Islamic banks. Neither category of banks lends to smallholders. The full list of banks operating in Jordan is shown in Table C2.

Table C2. *List of banks operating in Jordan.*

	Commercial banks
1.	Arab Bank
2.	Arab Banking Corporation (Jordan)
3.	Bank of Jordan
4.	Cairo Amman Bank
5.	Jordan Commercial Bank
6.	Jordan Kuwait Bank
7.	Jordan Ahli Bank
8.	Housing Bank for Trade & Finance
9.	Arab Jordan Investment Bank
10.	INVESTBANK

Commercial banks	
11.	Société Générale de Banque Jordanie
12.	Bank al Etihad
Islamic banks (Jordanian)	
13.	Islamic International Arab Bank
14.	Jordan Islamic Bank
15	Safwa Islamic Bank
Foreign banks	
16.	Standard Chartered
17.	Egyptian Arab Land Bank
18.	Citibank
19.	Rafidain Bank
20.	National Bank of Kuwait
21.	BLOM Bank
22.	Bank Audi
Foreign Islamic bank	
23.	Al-Rajhi Bank

Microfinance institutions. There are 9 organizations operating as MFIs in Jordan. While growing rapidly over the past 5 years, the microfinance sector has remained small with only 462,595 active borrowers (as of second quarter, 2019)—of which an estimated 72% are women—and a total credit portfolio of around JOD 251 million (Palladium Europe BV 2019). These MFIs' agriculture sector lending has an extremely low non-performing loan (NPL) rate: Less than 1.6% of the total loan portfolio. The largest MFIs have robust internal controls, audit functions and risk control procedures and have benefited from increased donor-financed inflows into the sector. Ithmar (Islamic) and NMB (traditional) are among the most active MFI agricultural sector lenders.

Leasing companies. These include 32 firms, of which 8 are subsidiaries of banks and participate in financial leasing activities. These companies extend leasing finance to the real estate sector (70% of the leasing portfolio), mainly for automobile and home purchases. Minimal leasing is extended to the agriculture sector, though some equipment dealers do offer payment schemes for tractors and other equipment, but rarely to smallholder farmers.

Exchange houses. These 140 firms with 256 branches make up the largest group of non-banking financial institutions in Jordan. They play a significant role in domestic (cash-to-cash, cash-in and cash-out services for PSPs) and cross-border remittances. They are licensed by CBJ to practice money exchange under the money exchange business law.

Payment Service Providers. Currently, there are no active digital payment or savings schemes dedicated to farmers, apart from the digital agriculture marketplace Ghoorcom, which is exploring mobile payment options for the 200 farmers in its database.

Digital Finance Services (DFS) and Mobile Money Digital Finance Services (MMDFS). These facilities have the potential to expand the delivery of basic financial services (savings, credit, insurance and money transfers) through innovative technologies and digital payment platforms. The rapid increase in internet access and smartphone ownership has made internet banking, mobile phone banking and mobile wallet usage more possible.

Mobile phone ownership in Jordan is 92.1%, with 76.5% of the adult population owning a smartphone, and 83% having internet access either through a computer or a mobile phone. According to the Financial Inclusion Diagnostic Study done in 2017, 1.4% of the adults have internet banking, and 2.1% have mobile banking services. User rates have gone up in the past few years with most banks offering and actively promoting mobile banking products.

There are no specific numbers available for agricultural enterprises using DFS or MMDFS specifically. General awareness amongst farmers of digital payment services is low; many farmers prefer cash transactions.

Following the latest Financial Inclusion Strategy, which is aimed at making financial services accessible to everyone, all MFIs now have started supplying digital financial services, either through mobile applications, their websites, or PSPs, which helps the MFIs in lowering their operational costs and enhancing their outreach, especially in rural areas.

Seven of the nine MFIs (Micro Fund for Women, Ethmar, Tamweelcom, Ahli Microfinance Company, National Microfinance Bank, FINCA and Vitas) are currently involved in DFS (tablet loan processing and disbursement through mobile wallets) and are equally integrated with eFAWATEER.com (an online bill payment service) for loan repayment. Zain Cash and Dinarak are the two leading mobile money (MM) providers, together covering most MM transactions.

However, the uptake of DFS in general is hindered by a lack of awareness of its benefits, trust issues and the fear of appearing on the tax radar as well as some of the logistical challenges posed by the know your customer (KYC) regulations (e.g., a paper form must be collected).

Banks and MFIs are partnering to work on DFS. One example of such a collaboration is between FINCA and Dinarak, but several other banks have said they too are close to entering such partnerships. Another relevant initiative is the collaboration between Dinarak and Mercy Corps, which partners with CBOs to provide interest-free loans to farmers and households to implement water-saving technologies. The loan disbursement and repayments are all digital. Then there is the National Aid Fund whereby the government will make digital welfare payments to 50,000 people in the governorates.

Insurance companies. There are 24 insurance firms in Jordan with a predominant focus on medical insurance but no products for the agriculture sector. Despite repeated GoJ attempts since 1990 to introduce agricultural insurance, private firms consider that it would entail excessive costs and cause losses. Insurance companies view agriculture as high-risk, and there is a general lack of data and information on the basis of which risk levels could be calculated.

Insurable risks must meet the criteria set for efficient operation of financial products. If data on hazard and exposure is readily available, companies consider whether there is a commercial case for gathering that data, which in many cases is prohibitively high. Index-based insurance can mitigate this concern as its sole reference is an independently verifiable index. This is particularly significant for slow-onset perils like drought for which the impacts build up gradually over time and are difficult to isolate from other perils.

GoJ Compensation Programs and Agencies

Primary public financing agencies. The five main public financing agencies in Jordan are the ACC, the Development and Employment Fund, the Military Credit Fund, the Postal Savings Fund (PSF) and the Governorate Development Fund. These institutions tend to offer much lower interest rates than MFIs, have slow processing times and sometimes ration credit due to funding limitations.

ACC is the key agricultural finance provider. It provides over 7,000 loans to farmers in a year. In general, it is the preferred channel for farmers when compared to banks and MFIs. The other agencies rarely work with subsistence and smallholder farmers.

Agricultural Risk Management Fund. In 2007, the GoJ issued a law establishing an Agricultural Risk Management Fund aimed at reducing the impacts of natural disasters. The basic principles for the fund's operation were prepared and a fund manager was appointed who would report directly to the Minister of Agriculture. However, the fund has not yet begun operations due to lack of capitalization.

The fund's planned approach is as follows:

- The insurance premium for a farmer's crop is determined by productivity per unit area over the last three years. The same principle applies to livestock.
- The farmer contributes no less than 30% of the premium.
- In the beginning, insurance is offered for specific crops against specific risks, giving priority to drought and unirrigated crops, and projects financed by loans from the ACC.

Compensation cannot be more than 75% of the insurance value. No compensation is paid if the loss is less than 25% of the insurance value.

Development of a state-run Takaful insurance company. The MoA is establishing its own cooperative named Takaful Insurance Company in collaboration with the private sector. The ministry will subsidize 70% of the premium, and

farmers will have to pay the rest. The insurance policy will protect farmers in the eventuality of natural disasters including frost, floods, heatwaves and snow as well as loss of revenue if the market prices of their crops decline[18].

Historical compensation. During the period 1985-2005, the GoJ compensated farmers (mostly in the Jordan Valley) primarily for losses due to frost and floods, though it did expand the program to drought toward the end of the period after the experience of a historic drought around the turn of the century. Compensation was based on estimates of losses made by specialized committees and was given to farmers in the form of:

- Waiver of interest on loans (especially those taken from the ACC) and rescheduling of loans;
- Subsidized supply of fodder for livestock; and
- Direct financial pay-outs.

During this period, interest exemptions on agricultural loans totaled JOD 35 million and cash compensation pay-outs of JOD 2.5 million. The fodder subsidies are explored in depth by Fragaszy et al. (2022).

C2. Additional Detail on Semiformal Market Actors

Community-based Organizations. CBOs are comparable to SLGs (described below) in that they are non-banking financial institutions such as cooperative societies or comparable group entities that provide their members access to funds at low rates of interest with longer repayment periods. They generally operate within a single community and are slightly more formal entities than SLGs.

CBOs are usually externally funded and supported. Some receive funds—mostly revolving funds—from multiple donors. In this case, CBOs act like MFIs using donor funds and related technical assistance, although most or all of the funds tend to be from international funders using local NGOs to implement their projects.

Using revolving funds, CBOs offer micro and small loans that range from JOD 200 to >5,000 with a maximum repayment period of 3 years and a service rate of 5-10% to cover operational costs. CBOs usually do not use any digital financial services apart from some piloting with e-wallets involving Dinarak (Mercy Corps 2018).

There are many experienced and well-managed CBOs, such as the ones working under the IFAD-funded Regional Economic Growth and Employment Project offering financial services to rural and agricultural households and enterprises. Some CBOs are open to including added financial services in their portfolio, for example, by acting as agents for DFS providers offering e-wallets and cash transactions.

For this assessment, we interviewed 6 CBOs, mainly those working with women and youth to empower the community by collaborating with donors, stakeholders and charities. CBOs are considered strong influencers in the local community. Most of them prefer and offer Islamic financing.

Many of the CBOs supply informal small and medium-sized credit. While they are not registered with the CBJ, they are in many instances registered with the MoA. Their lending options are socially embedded, allow a bit more flexibility in repayment, and charge little to no interest.

Savings and loan groups. SLGs are self-managed groups without external funding. There are thousands of SLGs in Jordan, with membership usually ranging from 15 to 20 members. Some SLGs offer lending services by aggregating monthly deposits from each member of the group and giving the whole monthly sum to one member of the group. The recipient of the monthly sum is decided as per a predetermined rotation, which ensures that each participant will eventually receive a large pay-out. The group fund and its potential proceeds from interest are paid back to the original members. SLG microloans usually do not exceed JOD 200 and have a maximum tenure of 12-18 months. Some SLGs work with the *ja'maaya* concept whereby no interest is charged in keeping with religious beliefs (see Section C4 for a comparison of SLG pooled funding and *ja'maaya* below).

[18] *Source:* MoA, Head of the Agriculture Risk Management Fund, Dr. Mohammad Awaideh.

C3. Additional Detail on Informal Market Actors

Commissioners. The bulk of the credit for farmers comes from the informal sector in the form of lending by commissioners—whose estimated cash flows add up to around JOD 2 billion, according to the Amman Municipality. The services offered by traders, commissioners and input suppliers are simple and easy to access, trusted and flexible on repayments. Commissioners are rich in cash and often do not require financing. They are the main lending source for the many farmers who do not own any land and do not have proper financial documentation.

A medium-sized commissioner dealing with 50-60 farmers can give out large loans of JOD 5,000-50,000 while big commissioners dealing on an average with 100 farmers can provide individual loans up to JOD 200,000. Both sets of commissioners accept checks, banknotes or any mortgage as collateral. Some are farm owners themselves and well-informed through media and internet platforms. They are familiar with modern hardware equipment including water-saving irrigation technologies and are willing to support farmers in improving their irrigation systems.

There are about 130 licensed commissioners who are brokers at the Vegetables and Fruits Central Wholesale Market and its related municipality markets. They set the buying price for all agricultural products in the market, both imported and locally produced. This involves offering a minimal preseason price to farmers and procuring their entire harvest through to the end of the season. Most smallholder farmers do not have access to alternative large markets and therefore sell to commissioners at the offered price. Any transaction at the central market takes place through a commission agreement in which:

- The commissioner receives and sells the produce on behalf of the farmer;
- The quality of the product (the main criterion being high water content) is a priority consideration when buying a harvest and releasing the payment in cash;
- Once a sale is made, the commissioner transfers the buyer's payment to the farmer;
- Commissioners provide the selling farmer with a formal receipt bearing the transaction details including the product weight, unit sale price, the total amount of the sale, and any withholdings applied.
    - Commissioners charge farmers 10-17% of the total sale amount (accounting for taxes), and more if they provide transport from farm gate to market.
    - Sometimes farmers sell to central market commissioners via middlemen visiting their farm. These middlemen take a commission of 5-10% of the sale and deduct taxes.

Our previous investigations showed that commissioners buy a farmer's produce before it reaches full maturity at a price 20-30% lower than the average market price (depending on transport costs), and then connect the farmer to suppliers to procure equipment and inputs on credit. Farmers accept the lower price lest their postharvest losses be higher. The commissioners also ensure crop surveillance and put pressure on farmers to undertake heavy watering of crops, so as to increase water content in the produce (and therefore its weight and quality aesthetic) but this can lead to water losses to deep percolation. On the other hand, suppliers sell inputs and equipment to farmers on credit at a 20-50% higher price compared to cash, with the price range dependent on commissioners' advice on the farmer's credibility and performance.

Export contractors. These contractors provide financing to farmers on a contract basis. They buy the product in advance for a pre-agreed price. They usually pay a 20-40% down payment to the farmer who uses it for on-farm spending to enhance yield.

Input suppliers. Suppliers of seeds, pesticides and fertilizer provide informal credit to farmers and accept payment after the produce is sold. The collateral required by input suppliers depends on whether the farmer is a regular client, or otherwise a familiar person. The suppliers' main priority is to recover their sales revenue; so they do not prefer to sell to farmers with a record of deferred payments. Exceptions are made for high-performing farmers in surplus-producing areas.

Hardware suppliers. These suppliers sell agriculture equipment and services on credit to reputed farmers; in the case of farmers not familiar to them, they make the sale through commissioners, taking postdated checks as security.

C4. Difference between Savings and Loan Groups and *ja'maaya* Group Lending Practices

The *ja'maaya* system is widespread in Jordan. It serves as an informal mechanism of access to finance. In the *ja'maaya* system, each member of the group makes a monthly deposit and then the entire monthly sum is provided to one member of the group.

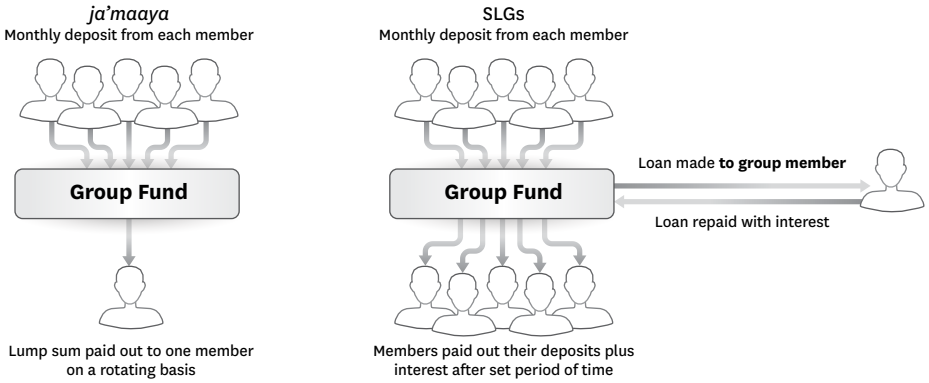

Figure C1. *The difference between the lending practices of savings and loan groups and ja'maaya groups. (Source: Authors.)*

The recipient of the monthly sum is predetermined by rotation, which ensures that each participant will eventually receive a large pay-out. The difference between the lending practices of savings and loan groups and *ja'maaya* groups is illustrated in Figure C1.

Annex D. Comparison of Formal and Informal Financial Sectors

Table D1. *Comparison of formal and informal financial sectors.*

Formal financial sector	Informal financial sector
These institutions usually ignore smallholder farmers, low-income households and small-scale enterprises. They favor a larger-scale, well-off and literate clientele that can satisfy their loan conditions.	Actors in this sector provide credit facilities to small farmers in rural areas, lower-income households and small-scale enterprises in urban areas.
They have complex administrative procedures that are not familiar to farmers in rural areas.	Lending procedures are straightforward and easy to understand for farmers.
Loan application procedures and origination are complex and require reading and writing skills so that a file on the borrower will be established.	Access to credit is simple, non-bureaucratic and not entirely based on written documents. Literacy is not a prerequisite to understanding the process.
Loan processing is complex, resulting in lengthy delays before final approval or rejection. Even when approval has been obtained, loan disbursement and delivery can be a bit slow.	Simple and direct processing of loan requests allows for prompt approval with minimal delays in disbursement. Rejections are low, but the level of risk is reflected in the interest rate charged.
Collateral requirement corresponds to the situation of well-off urban dwellers; it may be based on the borrower's deposits or savings account in a commercial bank, or property that can be mortgaged.	Collateral requirement is appropriate to local conditions and borrower capacity. Loan conditions may be based on precise knowledge of farm size and/or crops grown as indicators to the borrower's capacity to repay.
Transaction costs are high.	Transaction costs are low.
Repayment rates are low.	Repayment rates are around 20-35%.
Formal sector institutions do not have close contact with the social environment in which they operate. Sometimes they prosecute defaulters, which can have negative social repercussions; or sometimes they do not sue for reimbursement, leading borrowers to believe that formal loans are free.	Informal sector actors are aware of the problems of farmers; so they deal with repayment difficulties in a pragmatic manner. Debt rescheduling is always possible.
Unfamiliar with the grassroots environment, formal institutions are ill-served by mediocre supervisory and monitoring networks and therefore are unable to gain insights into the activities of their clientele.	The informal sector has a dense and effective information network at the grassroots level, which enables close supervision and monitoring of borrower activity—particularly farmers' cash flows—whether or not they are members of an informal association. This contributes to efficient mobilization of savings and ensures a high rate of loan repayment.
Formal financial institutions charge exceptionally low interest rates, and sometimes get a source of funding through their regulatory body. Commercial banks apply moderate lending rates.	The informal sector charges competitive but high lending rates, which is a reflection of the scarcity of loanable funds.
The formal sector keeps written records of the activities of clients for future reference and as a source of data.	The informal sector usually does not keep a written record of the borrowings of its clientele. When it does, the procedures are simple.
The formal sector has loanable funds readily available.	The volume and availability of loanable funds are subject to seasonal fluctuations.
Formal sector institutions may receive grants, sources of funding and other support from donor agencies through their regulator, the CBJ.	The informal sector does not receive grants or other forms of support from donor agencies.
A regular offer of funds allows the formal sector to lend at any time of the year. Some governmental lending institutions are deprived of sufficient funds because of high default rates.	Credit mechanisms in the informal sector are not geared toward accumulating funds before the peak season when loan requests are highest.
Formal sector institutions could reach a widely dispersed rural clientele by collaborating with government lending institutions.	Informal sector actors are often aware of new farming methods.

Annex E. Additional Detail on Target Demand-side Actors

In this section, we present general profiles of key potential clients and provide additional information on farming communities and regions that could be targeted for financial drought risk remediation products.

Smallholder herders and cereal-livestock integrators in Tafilah. Smallholder herders in the Tafilah Governorate rely on barley grain, hay and crop byproducts from irrigated lands. In normal years, these products are sold to them at reasonable prices, or donated, by large farm owners; but in dry years they are costly to access.

In dry years, farmers use cattle as a treasury to buy feedstuff for the more drought-resilient small ruminants. Tafilah Governorate does not have a pastoral reserve to fall back on during dry years. Animal diseases, such as swelling of the lungs and sudden death, increase during prolonged dry spells.

During the 2021-2022 drought, Tafilah received only 80-130 mm of rainfall by May. As one local government official described it, "Herders face reduced precipitation due to climate change. During dry years, feedstuff inflation is around 50%. Fertilizer prices have increased more than five times in the past five years… a ton of urea increased from 180 Jordanian dinar to 1,100."

Intensive hydroponics in Ramtha. In our interviews, farmers said they do not to rely on any government or NGO support during dry years. Their conventional and organic vegetable systems can remain profitable if the cost of water does not increase above the threshold of USD 1/m^3.

Large commercial orchards in Mafraq. Few farms in Mafraq access ACC loans to support their businesses and mitigate drought events. Drought events cause depletion of dynamic pumping levels in wells. Orchard owners carry out maintenance of their wells annually (cleaning and lowering pumping levels) during the dormancy period of their trees. The average water tariff they pay is low (around JOD 0.005/m^3)[19]. There are no GoJ incentives for farmers to adopt water-saving technologies but they have benefited from donor initiatives such as USAID's MSD-oriented WIT Project (2017-2022).

Farmers have recourse to buying water from neighbors' wells or leasing illegal private wells. Drilling wells without official permission is a practice on several farms. Some officials reported that the ratio of illegal to legal wells in Mafraq is roughly 2 or 3:1.

At the time of farm establishment, farmers have to pay a guarantee of JOD 50,000 to the MWI. This money is paid back to them in case they abandon the farm after bankruptcy. This high cost of establishment is meant to discourage farmers from applying for well drilling licenses. However, government control over well drilling is limited to areas where there are municipal wells.

Few farmers in Mafraq keep small-ruminant livestock because they need considerable feedstuff, more than can be provided by orchards and vegetable byproducts.

Smallholder greenhouses in Irbid (Northern Jordan Valley, North Shuna). This region is characterized as 'semi-arid superior' with 410 mm precipitation per year. Irrigation is supplementary in both open-field (alfalfa, potato) and greenhouse-based systems (hot peppers, eggplant, melons and watermelons). Deficit irrigation is practised in dry years by reducing dosage and frequency.

Smallholder farmers in Jordan Valley (Middle Jordan Valley, Deir Alla, South Shuna). This area includes 60,000 greenhouses, which are irrigated with blended water (surface and treated wastewater) from the Jordan Valley. During droughts, the Jordan Valley Authority imposes restrictions on summer vegetable plantations and reduces water supply to them. To cope, farmers, apply deficit irrigation and drill shallow groundwater wells as much as permitted by the local authorities.

Orchards and open-field vegetables in Azraq. Most of the commercial farms in this region have orchards of stone fruits, olives, grapes, pomegranate, date palms and commercial open-field vegetables. They do not integrate livestock, except alfalfa and barley growers who rely on their own production to feed their herds under semi-stabling conditions (animals that forage and are fed by the farmer).

[19] *Source:* Groundwater monitoring bylaw #85 published in the official Jordanian Gazette 4718 number 4565 of 10/01/2002, amended in 2007 (#12 JG 1409 number 4815 of 03/15/2007), in 2013, in 2014 (#36 JG 1713 number 5268 of 03/16/2014), in 2015, in 2017, in 2019, in 2020 (years with no reference correspond to declarations cited in the press only).

Annex F. Interviews with Offer-side and Supporting Functions Market Actors

Table F1. *Interviews with market actors from the offer-side and in supporting functions.*

#	Actor	Entity	Position
1	MFIs	National Microfinance Bank	Unit head
2		Micro Fund for Women	Executive director
3		FINCA	Director
4	Suppliers	NDICO	Vice-president
		ADRITEC	Area manager
		Mais Co	Chief executive officer
5	Banks	Jordan Commercial Bank	SME business center manager
6		Jordan Islamic Bank	Human resources controller
7	ACC		Finance manager
8	Ministry of Agriculture		Director
9	National Agricultural Research Center		Project coordinator
10			Head of department
11	Insurance	Index for Insurance Services	General manager
12		Solidarity Insurance	Sales executive
13		Delta Insurance	Marine insurance manager
14	Jordan Loan Guarantee Facility	JLGC	General manager
15	MWI	Ministry of Water and Irrigation	Drought unit
16	CBJ		Head of Financial Stability Department
17	Dinarak		Chief executive officer
18	Commissioner	QAISI Office for Vegetable Commissions	Owner and general manager
19	Leasing company	Al-Ahli Leasing Company	Branch manager
20	MoA (ARF)	Agricultural Risk Fund	General manager
21	CBOs	Agricultural Cooperative Association of Almonds	Chairman
22		Agricultural Cooperative Dates Association	Chairman
23		Saqr Al-Jabal Cooperative Society for Military Retirees	Chairman
24		Dana Cooperative Society for Livestock Breeders	Chairman
25		Modern Association for Agricultural Production	Chairman
26		Rural Family Cooperative Society	Chairman

Annex G. SWOT Analysis of Banks, MFIs and ACC

Table G1. *SWOT analysis of banks, MFIs and ACC.*

Banks	
Strengths	**Weaknesses**
—Banks are well-established and monitored and supervised by the CBJ. —Cater to all market segments (except smallholders), including individuals, SMEs and corporate clients. —Offer diverse financial products with strict calculation of provisions and non-performing loans, as mandated by the CBJ. —Direct access to low-cost funding using CBJ medium-term advances to target the agriculture sector while offering preferential interest rates to farmers with a flexible repayment period of up to 10 years. —Solid capital for growth and expansion. —Strong branch network with advanced technologies. —Resolute relationship managers for customer portfolio management of SME and corporate clients. —Islamic banks offer Islamic financing instruments.	—Focus is on financing medium- and large-scale corporate, registered agriculture companies that are willing to provide sufficient collateral. —They do not provide technical support or training to agriculture clients. —Lack of exposure to the agriculture sector. —The absence of JLGC in offering credit guarantees on lending to farming businesses. —More efforts needed to better understand farmers' agribusiness and the modern technology used in agriculture. —Inadequate understanding of farmers' needs, which can result in poor recommendations on financial products. —Strict rules apply when rescheduling loan payments or restructuring credit facilities, as mandated by the CBJ.
Opportunities	**Threats**
—Banks could have an exclusive product for encouraging adoption of drought risk mitigation practices.	—Lack of finance would result in farmers not being able to upgrade and produce for commercial purposes. —Instability and devaluation in the market value of farmers' produce.
MFIs	
Strengths	**Weaknesses**
—Strong appetite in local communities for adopting high-technology and water-saving technologies. —MFIs are licensed by CBJ, so they are more dependable now.	—MFIs charge high flat interest rates of 15-20%. —No previous experience with smallholder farmers (lack of knowledge).
Opportunities	**Threats**
—MFIs entering a new market segment. —MFIs are currently working on product development plans, as it would be a good opportunity to help farmers with their plans. —Excellent outreach: MFIs have branches in 12 governorates. —MFIs are catching the attention of international donors, as Jordan has good investing opportunities.	—MFIs' bad reputation (frauds and loan sharks). —High operational costs will restrict MFIs from lowering their interest rates. —Religious barrier (limiting the Financial Stability Plan to Islamic services only).
ACC	
Strengths	**Weaknesses**
—Well-established business infrastructure that caters to the agriculture sector. It is the only specialized government source of formal agriculture credit in Jordan. —Sufficient capital for growth in agriculture financing: JOD 75 million. —Local market understanding and a large database of existing farmers. —Open and flexible approach to private and third-party partnerships. —Loan officers at branches are well-trained agricultural engineers. —They offer Islamic murabaha type of loans, which are desirable to farmers. —Flexibility of rescheduling loan payments and restructuring loans without restrictions.	—Weak channels of employee communication and outreach for promoting new products such as the recent one with the Jordan Renewable Energy Fund. —There is a gap in farmers' knowledge of ACC's terms of lending. In some cases, they do not approach ACC because they think it lends only to landowners, which is not correct. —Does not provide technical support or training to clients. —Lack of innovation and exposure to proactive drought management and modern technologies. —Weak product marketing efforts lead to a drop in product revenue and pricing. —Limited focus on training loan officers. —Do not take the debt burden ratio (DBR) of the debtor into consideration when calculating loan payment. —Past dues are not divided as the number of days outstanding. —Loans past due date are very high (almost 45% of the current loan portfolio in the year 2018). —Weak collection efforts due to high loan past due date ratio (45% for the current year).
Opportunities	**Threats**
—ACC does not have a product tailored to encouraging adoption of drought risk mitigation. They are open to partnership on this matter. —Investing in capacity building in ACC through local and international advisory services will create sustainable economic value. —Offering a financial product that leads to reduced energy consumption by reducing water consumption will have high demand from farmers.	—ACC is not regulated by the CBJ. This leads to limited transparency in their financials, especially the calculation of provisions and non-performing loans. —No insurance is available in the agriculture sector in Jordan leading to exposed market and credit risk for farmers. Thus, ACC is highly dependent on collateral for mitigating risk. —JLGC does not work with ACC. Thus, its loan portfolio does not have a third-party guarantee. —Restriction of ACC's credit portfolio to agriculture results in higher risk due to the lack of investment diversity.

Annex H. SWOT Analysis of Savings and Loan Groups

Table HI. *SWOT analysis of savings and loan groups.*

Strengths	Weaknesses
—Citizens are familiar with the concept of *ja'maaya*. —Strong social bonds among community members. —Affordable access to finance tool. —Easy to establish and requires little infrastructure. —Capital remains within the group: Interest paid on loans remains within the group and builds up the cash assets of members.	—Management and record-keeping skills needed.
Opportunities	**Threats**
—Facilitates access to savings and credit, especially for women. —Builds up existing Jordan River Foundation groups instead of establishing new ones.	—Low level of financial literacy among farmers makes it difficult for SLGs to keep track of their savings and manage their money.

Annex I. Offer-side Challenges

Table I1. *Root causes and recommended systemic changes to address offer-side constraints.*

Constraint	Root cause	Recommended systemic change
Low interest in agriculture sector	Formal financial institutions do not have much awareness of or interest in the needs of (potential) agriculture clients.	Staff of financial institutions should be trained on the business case for lending to farmers.
Unsuitable financial products	The financial products and services on offer are generic lending products that rarely meet the needs of agriculture clients, mostly due to the lending institutions' limited experience and awareness.	—There is a need for targeted agri-finance products, including Islamic products, to enable financial institutions to tap into this unserved client segment. —Technical assistance and training to assist banks and MFIs in developing appropriate agri-finance products, and also, to support Islamic banks in providing Islamic modes of finance for working capital and long-term financing. Rather than creating 'pink' products targeting only women, it would be advisable to apply a gender-inclusive design approach and develop a product to work for both men and women.
Limited business cases	—Lack of skills to evaluate and approve loans. —Bankers' lack of skills to confirm the business case of a farmer and limited capabilities to serve small farmers.	Training courses in agri-finance, marketing skills, customer service, credit and risk management to reach out to the target farming market and service them well in terms of loan demand, product, service and pricing.
No farmer marketing strategy	There is no marketing strategy and a lack of marketing channels for some banks to reach farmers.	Training on marketing strategies and the role of digital financial services related to agricultural products.
No expectations set toward clients	Many banks and MFIs do not have clear information packages for applicants outlining what the requirements are for credit and why farmers would or would not be accepted as a client.	Train staff at these institutions to interact with farmers in relation to credit appraisal for agricultural finance.

Table I2. *Constraints facing MFIs and other offer-side actors in commercial dealings with smallholders.*

Constraint	Comment
Regulatory limitations on MFIs	MFIs cannot offer a full range of financial services to their customers, whilst savings and payment products are especially relevant for their target agricultural segment. MFIs are unable to take deposits from their members, which precludes a critical source of cheaper financing for them. While the impact is likely moderated in the medium term by their access to the CBJ's financing schemes, it does result in them having higher interest rates for their clients.
Difficulty competing with ACC's low interest rates	Commercial competition with the ACC's subsidized loans is very challenging.
Low operational efficiency	MFIs' costs compared to their small loan sizes make their loans higher priced. Also, farmers' weak fiscal management skills and accounting records make due diligence on smallholder applicants very time consuming and costly.
Lack of product distribution channels	The lack of financial product distribution channels in rural areas due to high outreach costs, low population density and a commercially unattractive client base with low average incomes is a challenge to overcome.
High occurrence of NPLs	There is a large share of non-performing agricultural loans to smallholders due to unsuitable payment conditions (grace period, the possibility of delayed repayment, agricultural cycle-based repayment) and inaccurate business case assessments.
Incorrect allocation of loan funds	Farmers may spend their agri-loans for household consumption rather than stated production purposes. Formal, semiformal and informal institutions usually do not have regulated tripartite loan agreements involving input and equipment suppliers in place. There is a need to explore options that support financial institutions to extend credit facilities directly to hardware and input suppliers instead of farmers.
Collateral-based lending	The current focus on collateral-based lending is partially the result of the immature agricultural finance ecosystem in which there are no guarantees or insurance available to limit lending risks for smallholders.
Lack of credit guarantee	There is a need to increase financial actors' ability to offer smaller agricultural loan guarantees. This will facilitate cash flow lending and decrease the dependence on collateral. Designing credit facilities to be extended to suppliers can mitigate some risk and is of interest to some MFIs.
Bad reputation of MFIs	Poor repayment histories and harsh measures taken by some MFIs have led to negative press about the microfinance sector generally. MFIs are now being licensed by the CBJ and are slowly rebuilding their image in terms of reliability. There is also a need to build awareness of the reason for their higher interest rates.

Annex J. Comparison of *Takaful* and Conventional Insurance Products

Takaful insurance is based on the principle of joint guarantee. It is a system of insurance based on Islamic principles in which a group of participants mutually guarantee each other against loss or damage. Each participant fulfils their obligation by donating a certain amount (*tabarru*) into a fund. A third party, the *Takaful* operator, manages the fund. In case of loss or damage, the *Takaful* operator disburses the funds according to agreements with its participants. Any surplus is paid out only after the obligation of helping participants in need has been fulfilled. *Takaful* represents a protection and profit-sharing venture between the *Takaful* operator and the participants based on this principle (Wahab 2021).

Takaful requires that those who need protection take part in a risk pooling scheme. Fund participants are grouped by geographically defined areas and a set contribution is mandated based on local pasture conditions. The participants receive an indemnity when livestock mortality due to drought rises above the trigger level.

Takaful sells livestock insurance through a mobile money platform which automatically sends funds to pastoralists in case of extreme drought, based on their location and the value of their livestock. For example, households in the Horn of Africa are benefiting from an index-based livestock micro-insurance scheme to limit livestock distress selling (Jensen et al. 2015). This solution consists of developing and implementing market-mediated, index-based insurance products to protect pastoral herders from drought-related livestock losses.

Table J1. *Comparison of Takaful and conventional insurance products.*

Takaful	Conventional insurance
Cooperation is key. Funds are contributed by participant farmers. The pooled funds are used to protect other participants from risk.	Insurance policy shifts risk to the insurance company. Clients pay a premium to receive coverage.
Subject to government laws developed according to *sharia* principles and regulated by the Jordan Securities Commission and civil law.	Subject to civil law only.
Takaful operator invests only in *sharia*-compliant instruments that are free from uncertainty (*gharar*), gambling and chance (*maisir*), and interest (*riba*[20]).	Insurance companies are free to invest in all legal instruments like stocks, bonds, etc.
Profits or surplus funds are shared among the participants and operators of the *Takaful* fund.	Dividends are returned to shareholders.

[20] Note that we consider that the perception of all interest rates as *riba* is due to a particular religious interpretation.

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National leader: Ministry of Water and Irrigation

National partners: Department of Statistics; Jordan Meteorological Department; Ministry of Agriculture; Ministry of Health; Ministry of Environment; National Agricultural Research Center; National Center for Security and Crisis Management; and the University of Jordan

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