Doris Köhn
Editor

Finance for Food

Towards New Agricultural and Rural Finance

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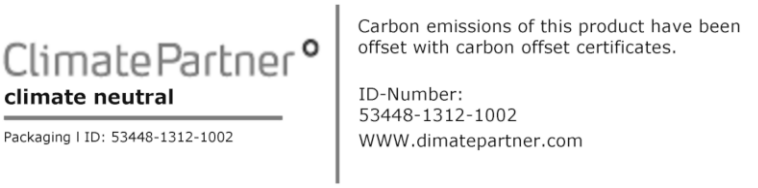

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Preface

It is a shocking fact that in today's world one billion people do not have access to sufficient food. In spite of manifold efforts by local actors, civil society, governments, and the international community, hunger remains the most striking and visible development issue in many countries of the South.

The global supply of food, however, is largely sufficient to feed the world's seven billion people. So far, agricultural production has been able to cope with our exponential demographic growth. And most experts are confident that further population growth – even the estimated peak of nine or ten billion people – can be accommodated by an increase in global food production.

However the success story called "the green revolution" has its price. Turning more and more land into soil will have severe environmental consequences, like water shortages, the concentration of toxic elements, deforestation, loss of biodiversity, erosion, and more. Moreover, these negative trends will be aggravated by climate change. Nevertheless, the fundamental issue is not availability of food but the accessibility of available food – both in physical (transport, storage, etc.) and in economic (purchasing power of the poor) terms.

Another promising way to limit the growth of the agricultural production required to feed the world is the reduction of post-harvest losses. Whereas the causes and challenges of developing countries are widely discussed and well known (e.g. transport and storage facilities), one should not forget that equally serious post-harvest losses occur in the North: not at the field site but on the supermarket shelves and in our refrigerators.

In view of this, the extent of increasing agricultural production might be debated. Eventually, it could be much less than the FAO estimated 70 percent required rise in output until 2050. There is no doubt, however, that food production in general must grow significantly in the next decades.

The question is: Where (and how) should this happen? Where is the potential? Many of the poorest countries, especially in Sub-Saharan Africa, possess large reserves of arable land and untapped water resources. Crop yields are generally far below those of other continents and irrigation is limited to six percent of cultivated area (Asia: 37 percent).

The growing private investment in African agriculture proves that land and water are valuable assets, especially in these times of high commodity prices. In view of the challenges, this trend is welcome in spite of some undesirable cases of "land grabbing." Agriculture and rural infrastructure had been suffering over years from under-investment, especially in Africa, and cannot be developed with public funds alone.

Alongside increasing private investment in agriculture, governments with support of the development finance community have reversed the trend and are now allocating substantial funding to agriculture and rural development. The multi-donor L'Aquila Food Security Initiative, launched in 2009 with financing of US$ 22 billion over three years, might be the most prominent example.

It is a fact that because of widespread poverty in rural areas and the labour-intensive nature of agricultural production, growth in agriculture will do more to reduce poverty and hunger than growth in any other sector of the economy. In particular, improving the productivity of small-scale farmers, and connecting them to the market, is largely considered to have the highest potential for increasing food production and supply. It could significantly increase the income of the poor.

The flow of investment into agriculture – both from private and from public sources – is definitely more generous today than in the past. Still, significant bottlenecks remain that slow investments in agriculture. For example, inappropriate legal and institutional frameworks, as well as political instability and insecurity. Such bottlenecks are difficult to ameliorate.

Access to capital and financial services is among the most prominent bottlenecks for small-scale farmers and processors. Yet, this can be changed. Unfortunately, many financial institutions remain extremely reluctant to engage in rural and agricultural finance. As a consequence, not only farmers and rural enterprises lack access to credit, but the majority of the rural population still has no access to the most basic infrastructure and financial services.

This was the key concern of the ninth KfW Financial Sector Development Symposium with the title "Finance for Food: Towards New Agricultural and Rural Finance": Identifying ways to encourage financial and physical "connectivity." In other words, finding ways to work for the inclusion of smallholder farmers in particular and the rural population in general that allow for accelerated agricultural growth.

About This Book

Strengthening financial institutions in rural areas is a cornerstone for mobilizing domestic capital through savings for future investments; it is also key to the development of a functioning financial sector that can serve the rural poor. Financial institutions working in rural areas face numerous constraints, such as poor physical infrastructure, dispersed demand, client profiles with high price and yield risks, scarce human capital, and limited collateral. These are some of the issues this book will address.

This book is the result of the Symposium "Finance for Food". More than one hundred leading international experts from Asia, Africa, the Middle East, the Americas and Europe joined KfW to discuss the challenges and potentials of delivering sustainable financial services in rural areas. The participants came from

banks, microfinance institutions, governments, international financial institutions, academia and agricultural industry.

This book focuses on three main issues. First, institutional and process innovations dealing with agricultural risk and the use of modern technology to improve financial services in rural areas. It starts off with an overview of the current systems, players, and different types of agricultural finance. While observing global trends that influence agricultural production and demand, the emphasis is put on the relevance of financial services for the rural poor. This overview is then followed by a more detailed look into the fields of process innovation, value chains, innovative microfinance, and a case study of Access Bank Azerbaijan.

Second, these aspects are complemented by a complex examination of the distinct risks associated with agricultural finance and how to assess and mitigate them. The successful management of agricultural finance can trigger the demand for and the offer of new financial products. Therefore, a variety of actors such as governments, DFIs, donors, and commercial investors are closely watching the evolution such new products.

Third, in view of the restrictions posed by deficient infrastructure and high transaction costs, the last part of the book focuses on possible distribution channels for reaching the rural poor with modern technology. This includes mobile banking as well as scoring to increase efficiency and outreach in agricultural finance.

I would like to thank the German government for supporting the KfW Financial Sector Development Symposium, the authors for their efforts in preparing the papers, and the participants for providing broad insights by looking at these topics from very different angles. Not least, I express my gratitude to my colleagues who organized the KfW Financial Development Sector Symposium and made this publication possible, especially Michael Jainzik, Claudia Schmerler, and Piero Violante, for editing and overseeing the production of this publication.

September 2013

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Table of Contents

PART I: THE BIG PICTURE: GLOBAL TRENDS AFFECTING AGRICULTURAL FINANCE

Global Dynamics in Agricultural and Rural Economy, and its Effects on Rural Finance 3

Renée Chao-Béroff

Food Security and a Holistic Finance for Rural Markets 23

Doris Köhn and Michael Jainzik

PART II: INSTITUTIONAL AND PROCESS INNOVATIONS IN SERVING RURAL CLIENTS

Finance Through Food and Commodity Value Chains in a Globalized Economy 45

Johan F.M. Swinnen and Miet Maertens

Agricultural Growth Corridors 67

Sean de Cleene

Innovative Microfinance: Potential for Serving Rural Markets Sustainably 89

Richard L. Meyer

Busting Agro-Lending Myths and Back to Banking Basics: A Case Study of AccessBank's Agricultural Lending 115

Michael Jainzik and Andrew Pospielovsky

PART III: DEALING WITH RISKS IN AGRICULTURAL FINANCE

Where Is the Risk? Is Agricultural Banking Really More Difficult than Other Sectors? 139

Klaus Maurer

The Potential of Structured Finance to Foster Agricultural Lending in Developing Countries.....167

Peter Hartig, Michael Jainzik, and Klaus Pfeiffer

New Approaches to Agricultural Insurance in Developing Economies.....199

Joachim Herbold

PART IV: USING MODERN TECHNOLOGY FOR HIGH-QUALITY SERVICES IN RURAL AREAS

Reaching the Client in Geographically Adverse Conditions: Can Outsourcing Increase Effectiveness and Efficiency? 221

Christine Westercamp

Tameer Bank's Experiences with Mobile Banking.....253

Shahid Mustafa

Poverty-Sensitive Scorecards to Prioritize Lending and Grant Allocation with an Application in Central America 263

Manuel A. Hernandez and Máximo Torero

Index.....285

Abbreviations

AATIF	Africa Agriculture and Trade Investment Fund
ADA	Austrian Development Agency
ADB	Asian Development Bank
AfD	Agence Française de Développement
AfDB	African Development Bank
AgDevCo	Agricultural Development Company
ASA	Association for Social Advancement
BAAC	Bank for Agriculture and Agricultural Cooperatives
BAGC	Beira Agricultural Growth Corridor of Mozambique
BIO	Société belge d'Investissement pour les Pays en Developpement SA
BMZ	German Federal Ministry for Economic Cooperation and Development
BRI	Bank Rakyat Indonesia
BSTDB	Black Sea Trade and Development Bank
CGAP	Consultative Group to Assist the Poor
COMESA	Common Market for Eastern and Southern Africa
CSIS	Center for Strategic and International Studies
DCA	Development Credit Authority
DEG	Deutsche Investitions- und Entwicklungsgesellschaft
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
FAO	Food and Agriculture Organisation
FIDES	Financial Systems Development Service AG
FMO	The Netherlands Development Finance Company
IADB	Inter American Development Bank
ICA	Infrastructure Consortium for Africa
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFPRI	International Food Policy Research Institute
IPC	International Project Consult GmbH
KERUSSU	Kenya Rural Savings and Credit Cooperative Society Union
KfW	Kreditanstalt für Wiederaufbau
LFS	LFS Financial Systems
MFI	Microfinance Institution
MIF	Multilateral Investment Fund
OAU	Organisation of African Unity

OECD	Organisation for Economic Cooperation and Development
OIBM	Opportunity International Bank of Malawi
PATMIR	Proyecto Regional de Asistencia Técnica al Microfinanciamiento Rural
RCPB	Réseau des Caisses Populaires du Burkina
RIF	Rural Impulse Fund
RUTA	Unidad Regional de Asistencia Técnica
SAGARPA	Secretaria de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentatión México
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SAGF	Sustainable Agriculture Guarantee Fond
SF	Structured Finance
SICREDI	Sistema de Cooperativas de Crédito
SMEP	Small and Micro Enterprise Programme
SPV	Special Purpose Vehicle
SSA	Sub-Sahara Africa
USAID	United States Agency for International Development
WOCCU	World Council of Credit Unions
WTO	World Trade Organization

PART I:

The Big Picture: Global Trends Affecting Agricultural Finance

CHAPTER 1

Global Dynamics in Agricultural and Rural Economy, and Its Effects on Rural Finance*

Renée Chao-Béroff[1]

1 What's New in Agricultural and Rural Environment?

Global developments have profoundly affected the lives of rural households in developing countries. They need to be understood in order to discuss the prospects of rural and agricultural finance.

Three-quarters of the world's 1.4 billion extremely poor people live in rural areas, leading to the conclusion that poverty is a rural phenomenon.[2]

Whenever development stakeholders and bankers talk about financing agriculture or economic activities in rural areas in developing countries, they inevitably express reservations about risks, constraints, unprofitability, costs, and bad repayment records. These shortcomings stem from poor performance, state-owned agricultural development banks, agricultural development projects delivering loans within their credit components, and some special governmental programs. They may also stem from days when governments and state-owned firms or public trade boards had the monopoly of extension services to farmers and of the commercialization of strategic crops (for national food security or for export). It may also date back to times when villages were still quite isolated from the rest of the country, and when people still lived in subsistence economies.

However, those days are now long gone. A number of major trends have emerged globally, including in developing countries, which have deeply modified the overall landscape of the agricultural and the rural environment.

It is important to have an overview of the seven major changes that have taken place, impacting agricultural and rural economies. Among these changes, some

* The preparation of the paper was financially supported by the German Federal Ministry for Economic Cooperation and Development (BMZ) via KfW development bank. The author is grateful to her peers in the review committee for their inputs and especially expresses her thanks to Michael Jainzik of KfW for his contributions to enrich the paper.

1 Director Microfinance Department CIDR & General Manager PAMIGA.

2 See Alan Doran et al., "The Missing Middle in Agricultural Finance", *OXFAM GB Research Report* (December 2009), p. 8.

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could be considered as mega-trends since they are observed globally and have long-term effects:

- Liberalization of national trade in agricultural commodities;
- Demography and the place of youth;
- Migration as a way of life and an income/capital building strategy;
- Climate change – risks and opportunities;
- Economic growth in emerging countries;
- Emergence of a middle class in urban areas in developing economies with different consumption patterns;
- Technology and, in particular, the phenomena of cell phone and Internet.

1.1 Mega-Trends Impacting the Rural Economy

Liberalization of Trade in Agricultural Crops

Along with structural adjustment and reforms that were conducted in the 1980s and 90s, many developing countries have liberalized their economies in different dimensions. In particular, their national agricultural markets as well as international trade in agricultural produce – both in food crops such as cereals and in cash or export crops such as coffee, cocoa, and cotton – became less controlled.

After decades of state monopoly for trading and marketing crops in most countries, this change first led to disarray at the level of small farmers and farmers' organizations, followed a few years later by a boom in new private actors. This filled the gap left by the closing down/privatization of many governmental structures.

The private actors involved are of all sizes and intervene at every possible segment of the commodity chain. Some are large firms, national or international, that bided for the acquisition of the state-owned firms. Some are large or medium trade companies. But what was the most remarkable was the number of micro and small entrepreneurs who took this liberalization as an opportunity to set up businesses in agricultural value chains. This is the starting point for new entrepreneurial behavior in the rural population in every local economy.

The result of the liberalization of the economy could be seen in the growth of GDP that has taken place in the vast majority of developing countries during the last decades. Countries that have applied deregulation reforms have performed significantly better than others. Reformers among African states have delivered a GDP growth in average two percentage points higher in the 2000 to 2008 period, compared to the group of non-reformers.[3]

[3] See McKinsey Global Institute (MGI), "Lions on the move: the progress and potential of African economies", *MGI Research Report* (June 2010).

However, this liberalization has not necessarily resulted in a rise in prices of crops to local producers and, therefore, in income at the level of rural households, since it has been also combined with acceleration in globalization of trade and in unfair competition. Many small producers who are still lagging in a subsistence economy have not found the way into the new market environment.

Table 1, published by the Word Trade Organization (WTO), shows a correlation between the growth rate of merchandise exports and of GDP.

Table 1. Merchandise Exports and GDP by Region 2007–2010

Annual % change	2007	2008	2009	2010[a]
Volume of merchandise exports				
World	6.5	2.2	–12.2	13.5
Developed economies	4.8	0.8	–15.3	11.5
Developing economies and	9.0	3.8	–7.8	16.5
Real GDP at market exchange rates (2005)				
World	3.8	1.6	–2.2	3.0
Developed economies	2.6	0.4	–3.5	2.1
Developing economies and	8.0	5.7	2.0	5.9

[a] Projections

Source: WTO Secretariat.

After the 2008–2009 crisis, 2010 is expected to be an exceptional year in terms of the growth rate for trade; developing economies are counting on exports (16.5 percent) to pursue strong growth in GDP (5.9 percent).

In a decade or so, the GDP per capita of developing countries has doubled.[4]

Demography and the Place of the Youth

Many analysts have been warning decision-makers about the phenomenon of ever-increasing populations of young people who are going to represent more than 60 percent of the population in the developing countries.[5]

The youth are better educated than in previous generations and, above all, more mobile. They have been seasonal migrants, going to search for work in neighboring towns and cities, in wealthier regions within the country, in neighboring coun-

[4] See IMF, "The World Economic Outlook Database", *IMF publication* (October 2009).

[5] See David Lahm, "The Demography of Youth in Developing Countries and its Economic Implications", *World Bank Policy Research Working Paper*, Vol. 4022 (October 2006).

tries, and even across the oceans. This mobility has served as an eye opener for other ways of life, behaviors, and opportunities. Some who come from rural areas choose afterwards to settle in towns and cities. Others may go back to their villages to have a family but still aim at a better life than that of their parents. They bring new attitudes to rural areas. This includes innovations in production, commercialization, housing, and new qualities in relations with other members of the family and the community, such as the use of financial services like savings and credit in order to support investment.

Without over-generalizing on such a wide and crucial issue, one could observe that the rural youth in developing countries tend to be more individualistic. They are also more entrepreneurial in farming, like in the choice of crops to grow, in integration in value chains, in business links with others, be it fellow producers or buyers or bankers.

Girls and young female adults may be a little bit less determined to face the criticism of the family and the community; however, we also see a lot of them traveling to look for work. When they have the chance to escape from burdensome social structures, they will not go back to the village.

Migration as a Way of Life and a Capital Building Strategy

Migration for economic purpose has been there since memorial time. The Chinese and Indian diaspora, for instance, can be found everywhere in the world and those who have succeeded abroad are now investing back home, both in highly qualified human resource and in capital, bridging markets, and cultures.

With the influence of the media and the facility of transport, generations of youth from developing countries are migrating abroad to find jobs, to earn money and send remittances back home: But they also experience a new life, probably with more freedom. It has become a way of life, even for the poor in developing countries.

Remittances from migrant workers represent billions of dollars or euros and account for a significant part of GDP of many developing countries. Migrants tend to come from poor and remote villages in rural regions. Hence, when they send money home, it is to families still living there. Remittances have become the main source of income in many rural regions in developing and transition countries and also very often the main source of investment in individual and collective infrastructure, for social and for productive purposes. For instance, in a region of Mali, such as Kayes, migrants have financed clinics, schools, warehouses, and small dams for irrigation, as well as health insurance systems.[6] They are the best depositors in microfinance institutions (MFIs).

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[6] See AfDB and French Ministry of Foreign Affairs, "Le transfert de fonds par les travailleurs migrants au centre des efforts de développements en Afrique", (2008).

Studies that the author completed in the early 1990s on "life stories" of small entrepreneurs in developing countries (Asia and Africa) show that the vast majority has been able to accumulate their startup capital during their years of work abroad, where the pressure of family, relatives, and the community is reduced by distance and therefore allows for them to save[7]. It is often also an opportunity to observe the management of modern organizations, to get acquainted with banking services, and to learn skills. Micro, small, and medium-sized enterprises (MSMEs) created by these former migrants tend to be better run, grow faster, create jobs, and ultimately are more sustainable. For instance, in the Philippines the majority of small and medium enterprises (SMEs) in secondary towns, financed by the MFIs, are created by migrant workers who have stayed several years in Saudi Arabia or other countries in the Middle East. Far from being a problem, migration is being seen by local stakeholders as an asset for economic development of developing countries and of poor rural areas.

Awareness on Climate Change and New Opportunities

The awareness of the impact of climate change on local production and economy is rather recent, at all levels. So is the awareness of what causes the deterioration of the environment and the responsibility that everyone bears to preserve and protect the environment, starting at the local level. Despite the negative effects on rural communities that climate change is likely to produce, the social and business reaction on climate change may also carry some chances. It needs at least to be taken into account because of its effect on rural economies.

It is not rare, for example, to see communities organizing themselves to prevent against desertification by planting trees, and to try to maintain arable land by constructing new dams or flood-control retention basins. A lot more solar energy-powered devices can be found in homes and offices, as well as in schools, health centers, pumps, and market places. Solar energy is being considered as an industry. Used water and waste garbage is retreated; recycling is seen as a potential business for firms from the private sector.

1.2 Mega-Trends Impacting the Agricultural Economy

Economic Growth in Emerging Countries and in the BRIC: Impact on Demand for Agricultural Produce

Economic growth in emerging countries and in the BRIC countries has been very substantial during the last few years. This growth has also been achieved through a very dramatic socio-economic change in many different ways. In China, for in-

[7] See Renée Chao-Béroff, "Histoires de vie des petits entrepreneurs en Asie et en Afrique", *Fondation Charles Leopold Mayer* (2004).

stance, millions of rural dwellers have been mobilized to become workers in factories in cities and in the coastal areas. In terms of food and agriculture, this means a major shift from farmers producing crops to consumers to feed.

In India, China, Brazil, and many other emerging countries or even in the so-called Least Developed Countries (LDCs), rapid urbanization has led to a pressure on the supply for food that the neglected countryside and aging farmers have not been able to deliver. This has been, at least for a large part, the cause of the food crisis of the last few years.

Emergence of an Urban Middle Class with New Consumption Patterns

The growth that developing countries have been experiencing during the last decade – steady for some, spectacular for others – has led to the emergence of a significant middle class. This middle class is made up of people who have a fairly good level of education, often double income households, living in cities as a nuclear family with fewer children than in traditional families. Their relative purchasing power is significant as a consequence of these factors.

The consumption patterns and habits of this middle class have also changed due to this new life style. They will tend to shop in supermarkets rather than in traditional markets. They buy more pre-prepared food in smaller quantities to suit the size of the family (nuclear) and of the lodging (apartments). They prefer better quality than large quantity. School children want to copy the way of life they see on television and in ads, which affects both their nutrition and their clothing.

This phenomenon is so widely spread globally that it has been part of the recent food and price crisis in major cities in the developing countries. For instance, according to observers in Dakar, the price of millet, the traditional staple food, has not rose much, while the price of imported rice increased tremendously in 2008 and 2009.

An urban middle class with a good purchasing power is the solvent demand and market that the agricultural sector of developing countries has been hoping for in order to boost its production. For instance, Basmati and perfumed rice are now grown in many African countries, competing with imported Asian long grain rice for the higher end market. However, the pre-conditions for success are to adapt the supply to the new demand via the appropriate distribution channel.

Increasing numbers of national and multinational corporations have seen it as a huge opportunity and are entering this market, building value chains in linkage with small and medium farmers. They are willing to invest in technical assistance, infrastructure, financial and non-financial services in order to retain serious suppliers who will deliver timely, quality crops.[8]

[8] Cf publications on value chains listed in the bibliography.

1.3 Mega-Trend Impacting Both Agricultural and Rural Economy

Technology and the Cell Phone and Internet Revolution

Cell phones and, to a lesser extent, the Internet have totally modified access to communication, information, and related services for a vast majority in the developing world. And for once, it is not only in capital cities and wealthy neighborhoods. For millions of people who had never had access to a land line and who were isolated from everything, cell phones have been a true liberation. This is the reason why the penetration of this technology has been so fast, so broad, and so deep regardless of its costs.

The cell phones and the Internet have radically changed the access to information for individuals and for enterprises, especially those who are operating in low-population density areas.

Information has always had a key role to play in economy and economic development. Prices for and availability of commodities (inputs, equipments) and crops on markets are key for balancing information asymmetry, enhancing bargaining power for farmers, and increasing flows of goods. The experience of e-choupal launched by India Tobacco Company in India, in building an information platform providing e-commerce support adapted to the rural areas, is an example of how Internet can be used to design a transaction model between farmers and a processor/seller[9]. In West Africa, cell phones provide market and price information to fishermen who then sell their catch where the prices are higher[10].

Similarly, cell phone, MIS, and Internet are used by institutions to lower transaction costs for clients and for securing information when delivering services in rural areas. Technology has been also used to reduce costs in setting up weather stations allowing an innovative approach to a major risk mitigation mechanism[11].

The Agricultural and Rural Environment Today

In view of these major changes during the last few years, it is clear that they have radically impacted the rural economic and social landscape, and have modified the parameters for agricultural production in a quite positive way. There is a large, unmet demand for agricultural produce that could stimulate production for the first

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[9] See B. Bowonder et al., "Developing a Rural Market e-hub: The case study of e-Choupal experience of ITC", *Indian Planning Commission Report* (2002) and S. Sivakumar, "Streamlining the Agricultural Supply Chain: Lessons Learnt from E-Choupal", *Bazaar Chinta,* Working Paper, No. 35 (June 2005).

[10] See the project of the Fédération nationale des GIE de pêche au Sénégal, "Internet et telephonie mobile pour l'acces aux prix agricoles", *International Development Research Centre* (April 2005).

[11] See IFAD and WFP, "Creating Pathways Out of Poverty in Rural Areas: Managing Weather Risk with Index Insurance", *WFP publication* (2008).

time in many years; this demand is coming from a solvent urban middle class in the developing countries themselves.

There are new skills and new entrepreneurial spirit among youth including in rural areas that could be mobilized for the modernization of the rural economy and for agribusiness. Some have started investing in agricultural value chains. IT technology, particularly cell phone usage, has been easily adopted by large number of rural individuals and enterprises and is used to reduce information gaps and transaction costs. No doubt, these factors are essential for creating an enabling environment for investment in rural areas and in agricultural production. The private sector has clearly identified them and is aggressively entering the sector to take advantage of this favorable situation.

Hence, today, it is now possible to operate and finance agricultural and rural activities profitably. They are mostly run by entrepreneurs and enterprises that have assessed their risks, evaluated their potential gains, and made a well-thought-through investment. Today, modern agriculture in developing countries is, by and large, private-sector led and profitable. Lower-end rural households have developed a diversification strategy to mitigate risks and get regular income throughout the year. This strategy has been paying off and could be financed quite safely through adapted lending methodologies.

Over the last two to three decades, this situation could be considered as a unique chance for agriculture and off-farm activities to support significant growth for the rural economy in developing countries. Appropriate financing is highly needed to transform this opportunity into wealth creation.[12]

However, many challenges still remain, among others the negative impacts of climate change on production and productivity. This has led to tension over water and land, internally (between herders and farmers) or externally ("acquisition of farm lands by international buyers" – the issue of "land grabbing").[13] Will these large farms operated by foreign companies create decent and sustainable jobs for local laborers or will they marginalize the most vulnerable? Other challenges are related to access to technical advisory services for small farmers where public extension services have been phased out and not replaced by a private service provider. How will they be able to cope with new technical problems/crop diseases? How will they be able to take up new varieties or improve the quality of their production?

A decade ago, major African political leaders and their partners, in the context of the New Partnership for Africa's Development (NEPAD in 2001) and Comprehensive Africa Agriculture development Program (CAADP in 2003) and later, the Alliance for Green Revolution in Africa (AGRA in 2006) analyzed this situation

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[12] See for instance McKinsey Global Institute (MGI), "Lions on the move: the progress and potential of African economies", *MGI Research Report* (June 2010).

[13] See Article of Michael Pauron : "Terres achetées, quelle réalité", *Jeune Afrique*, September 26, 2010.

and found it promising. They have invested in developing new approaches to position themselves in what they see as a new opportunity. For instance, governments in SSA,[14] have focused their strategies for growth on agriculture as a major pillar and have thrived to build pro-active Public Private Partnerships. NGOs and TA providers have been innovative in developing methodologies to approach food security and agri-food value chains and offer new services to actors involved.[15] Banks and the cooperative movements have also set up dedicated departments to explore these new avenues.

With high competition in urban markets, some of which are near saturation, mainstream commercial microfinance banks have also recently been tempted to expand in the rural market and take part in this new agriculture boom.[16] Some have tried to deploy their existing products through rural branches and have met repayment problems on top of a major rise in costs. With existing products, the scope to reach a large segment of this agricultural and rural market may appear, depending on the context, to be quite limited. Some have called for expertise to assist in designing a rural and agriculture business line and are presently testing products before scaling up.

It appears that traditional and new players are interested. However, what seems to be even more obvious is the need for new sets of skills: knowledge of rural and agricultural economy, understanding of this specific market, opportunities and constraints, interactions between actors in a chain, in addition to financial analysis and product development. There are a range of new products, services, and innovative delivery mechanisms using technology to reduce costs while being physically present face to face with rural clients to build trust.

2 Emerging Models in Agricultural and Rural Finance

To talk about the new agricultural and rural finance, it is useful to provide some definitions and go back very quickly to the "old" agricultural finance and draw some lessons. In fact, the emerging models, both the modern rural finance model and the value chain financing model, have derived their basics from the lessons learned from the old models and incorporated best practices from microfinance, taking advantage of all the changes that took place in the environment while avoiding the major errors of the past.

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[14] Ex: Senegal Strategy for Growth 2008.

[15] See the publications of the Rural Outreach Action Group-E-MFP, "Value Chain development and microfinance – Review of current issues", (2010); Calvin Miller et al., "Agricultural Value Chain Finance, tools and Lessons", *FAO* (2010) and IIRR, "Value Chain Finance: Beyond microfinance for rural entrepreneurs", (2010).

[16] See the contribution of Meyer (2013) in this volume.

2.1 Definitions and Lessons from the Old Agricultural Finance

Three definitions are important:

- What is called microfinance is the provision of financial services to poor households that are excluded from conventional banks. It could be delivered in urban or rural areas and the clients could be involved in all sorts of income generating activities;
- What is called agricultural finance is the delivery of financial services to farmers/farming enterprises for their agriculture production activities. The farmers/farming enterprises could be large, medium or small;
- What is called rural finance is financial services delivered in a rural area, where there is no concentration of inhabitants and dwellings and where the major incomes are related with farm or off-farm activities.

Hence, normally, these three categories of financial services may not concern the same people, the same activities or even the same place where they are performed. However, for many decades and still now, poverty was a rural phenomenon and in developing countries, 60 to 70 percent of the poor were rural, living mainly of subsistence agriculture production. Therefore, it has been thought that poverty alleviation could be obtained by providing massive access to financial services to poor rural households.

Failures in agricultural finance in the 1970s and 80s, where agriculture was a governmentally led/dominated sector, are mostly due to:[17]

- Directed agricultural loans;
- Often provided by or through agricultural extension workers or agriculture development projects' staff with little financial culture and for whom loans are inputs included in technical packages;
- Subsidized interest rates, lax attitudes in loan recovery;
- Political interference, leading to the perception from borrowers, that those loans need not be repaid.

Hence, it is important to note that many of the causes for the failure of programs following this old paradigm are not related to the profitability of agriculture but are rather due to other external factors. However, the low profitability of agricultural production during those days remained the major reason why banks were reluctant to lend and farmers to borrow.

[17] See IFAD: "IFAD Decision Tools for Rural Finance", *IFAD publication* (2012) and Meyer (2013), in this volume.

2.2 Modern Rural Finance: An Emerging Model Drawing from Microfinance Best Practices

Modern rural finance is a positive combination of rural and microfinance, taking the best from both. From rural finance, it has integrated the lessons learned from strategies coming from the poor households themselves to diversify their income sources.

Many studies performed in poor and remote rural environment show that the households' budget has tremendously changed during the last decade or so. Next to income from agriculture and livestock, resources from trade, salaries (seasonal), and remittances have taken a much larger share and sometimes have over passed the former ones. For instance, a recent study done by Enda Inter Arabe,[18] a MFI in Tunisia, showed that 44 percent of the revenues of rural households come from other sources that agriculture: day wages (34 percent), salaries (21 percent), retirement pensions (19 percent), or trade (15 percent). In agriculture, small farmers also tend to diversify in order to mitigate price and market risks. In Burkina Faso and Mali, in a cotton-growing region, farmers use the capital accumulated from good years in cotton to invest in fruit trees, irrigated vegetable growing, and animal fattening, which has after some years almost totally substituted for cotton.[19]

Since poor rural households have diversified their income sources, it is important to provide loans not for one specific productive activity but rather for all the diversified economies of such households. Therefore, in sound rural finance, loan analysis is giving more attention to cash flow than in the profitability of the agricultural production activity for which the borrower has applied for and the terms have been matched with incomes from all sources at the different times when they are available.

Small farmers are often confronted with technical difficulties related to production: soil fertility, inputs, crop or animal illness, and no access to counseling since the phasing out of state extension services. This is a major risk for them. This risk is being mitigated by access to private agricultural business development service (BDS) providers who are now operating on a fee for service basis, even in rural areas. The cost effectiveness of such services is a key element to success as it has to be affordable and adapted to the needs. Grouping clients per catchment areas to reduce time and costs for delivery is essential. Access to such agricultural BDS has re-opened the perspective of running crop and animal insurance schemes sustainably and of using insurance as a risk mitigant for small farmers.

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[18] See GRET and CIDR, "Etude de marché pour le développement de produits pour servir les clients ruraux en Tunisie", *AFD research report* (2009).

[19] See Monitoring report for a Rural Finance Project in the Western Region of Burkina Faso funded by EDF and implemented by CIDR (2007).

Farmers are also confronted with climatic uncertainties that could affect their production. For many years, insurance schemes have been confronted with high costs for individual checking how crops have been affected in the fields. With progress in technology, costs for setting up mini weather stations in rural areas have been reduced significantly the costs of administration of payouts and therefore, insurance schemes based on weather indexes are now feasible. Satellite-based systems may give even greater opportunities for cost-reduction.

Health and access to health care remain a major risk for farmers since it conditions good working and productive conditions. Health microinsurance has been tested in different places by promoters, either by forming health mutual aid societies or for MFIs to partner as agents with insurance companies, to deliver this product to their clients. However, if the framework conditions are not favorable, provision of health savings and credit products could also serve as good risk mitigants.

In rural areas, being isolated is an important risk because services will be more expensive to be delivered, inputs will be more costly in retail, lobbying becomes inaudible by lack of critical mass, so is ability to attract buyers, processors, modern distributors. To address this risk, institutional strengthening of farmers' groups is essential.

Box 1: Livelihood Finance: An Innovative Approach of Basix India

Hence, while looking at risks from the perspectives of clients it has lead to what Basix India call, the "Livelihood Triad", a holistic approach involving financial and non-financial services, institutional development, aiming at promoting all the different livelihoods of poor rural households. Basix was the pioneer of weather index insurance a few years back and has designed health, crop, and cattle insurance schemes in partnership with private insurance companies.

Basix India has two financial institutions in its group, a local area bank that is deposit taking and a NBFI. It provides loans to one million borrowers, insurance services to 1.5 million clients, and remarkably BDS to 500,000 rural entrepreneurs and small farmers who are paying a fee for service rendered.

2.3 Value Chain Financing, Borrowing from Private Sector Financial Services to Small and Medium Farmers

Brief Definition of Agricultural Value Chains and Value Chain Financing

A value chain encompasses the full range of activities and services required to bring a product or a service from its conception to its end use. It involves the se-

quence of productive (i.e. value added) activities leading to and supporting final use. Hence, the term from "farm to fork" for agro-food value chains.[20]

However, all the value chains are not well organized or structured. The landscape goes from a very loosely structured value chain where there is a multitude of small buyers serving a large number of markets, which is often the case for food crops serving domestic markets, to contract farming where a large, often multinational, firm is dominating and vertically integrating the whole process downstream, usually for an export market. There is also a variety of intermediary situations in between.

There are short value chains where little value has been added from producers to consumers and longer value chains involving different levels of processing, conditioning, and distribution. Generally, the latter are those that are the most profitable and therefore the most promising to finance.

However, experience show that there are loopholes in all categories as behaviors condition the stability of relations between buyers and sellers. Ultimately, what really matters in a value chain is the width of the demand/market and the relative weigh of suppliers that will lead to a balanced negotiation and an overall win-win situation for both parties. The strength of a value chain resides in the sustainability of the relation between actors involved and a fair distribution of profit along the value chain. This is why a good analysis of value chains in a given market is essential to success in value chain financing. No financial intermediaries should enter this business unless they have done this exercise thoroughly and with the appropriate expertise.

The new approach that could be observed recently on the ground in developing countries is "value chain financing" (VCF) or using value chains as an approach to financing agriculture in an innovative and more secure way. A "value chain approach" means a form of financing that emphasizes the funding of actors that are connected among them and that are connected to the market. The links and securing the market outlet are the most important factors for success and loan repayment. Ultimately, the strategy in VCF is to ensure finance along the value chain in a continuum, and secure the outcome. This financial continuum could be provided by one player, i.e. a bank or an agribusiness company, especially in the case of an integrated value chain, but could also be developed in a partnership between different financial intermediaries which may complement one another in skills and in products.

[20] See also the contribution of Swinnen (2013) on value chains and value chain finance in this volume.

Box 2: Case in Fair Trade: The Experience of Starbucks[21] in Chiapas (Mexico)

Starbucks is aiming to have a sustainable supply of high-quality coffee by investing in the future of the coffee farmers and their communities in Chiapas through alternative loan programs and biodiversity conservation.

Farmers have access to loans that the commercial or traditional lending sector is unable to serve. During growing and harvest cycles, many coffee farmers dip into their modest reserves to cover expenses until they can sell their crops. Some farmers may even experience a cash shortage, prompting them to sell their crops early—and for less—to local buyers. Alternatively, farmers will sometimes borrow money at exorbitant interest rates until they can sell their crops. This cuts into their profits and sets up a similar scenario for the next year.

Starbucks provides funding to organizations that make loans to coffee growers, which will help them sell their crops at the best time to get the right price. The loans also help farmers to invest in their farms and make capital improvements. Starbucks provided with a US $4.5 million loan to *Verde Ventures* to increase access to financial services to around 380 small-scale coffee producers in Chiapas. Most of these resources were made available in a three-year rotating fund to pre-finance or provide working capital for *C.A.F.E. Practices* and *Conservation Coffee* farms in Chiapas, with a loan-loss guarantee for 70 percent from the Starbucks Coffee Company. Loans are made against coffee contracts with Starbucks and require a 6 to 7 percent savings by the cooperatives.

In addition, to improved on-farm productivity, more than 5,000 hectares of on-farm forested land was set aside for permanent protection. These set-asides lands contribute to the restoration of El Triunfo biosphere reserve's 121,000 hectares of buffer zone, and the price benefits and debt reduction of the program will impact more than thousand people.

Role and Positioning of Financial Institutions

The main lessons to draw from field experiences are the following:

Value chain financing works best when a tripartite arrangement, involving the farmers or farmers groups, the buyer/processor/distribution company and the bank in performing as contractually planned to assure the outcome of the operation, can be put in place. The contractual relations between the three players are the major substitute to formal guarantee. They are stronger when all parties have a long term market stake for which they are willing to sacrifice potential short term gains.

[21] Renée Chao-Beroff, "Starbucks, Fair Trade and Conservation Coffee in Chiapas", case study in *Incentives that work for enhancing public private partnership in Local Economic Development* (UNCD, 2010).

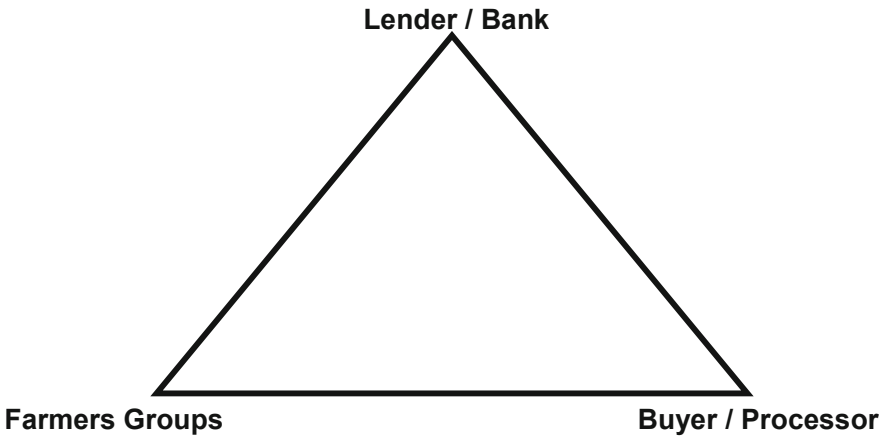

Fig. 1. Tripatite arrangements

In value chain financing, a financial continuum is often needed, both for operational considerations such as service delivery and repayment collection to farmers' door step where decentralized MFIs have their comparative advantage and for funding since different products and terms are needed when various actors/activities of a chain should be considered for financing.

The New Agricultural and Rural Finance Paradigm

This new paradigm is the result of a positive combination of lessons learned from the causes of failures from old agricultural finance, application of microfinance best practises for rural households who have diversified their income sources, and the new opportunities provided by market-driven agricultural value chains.

It is about provision of a large range of financial products and services to different segments of the rural markets designed with specific clientele to fit their needs and constraints, including savings, credit, insurance, transfer, and payments. These products and services are provided in such a way that they can fit into a personal financial management strategy and enhance autonomy and empowerment of the excluded. Access to non-financial services could either be delivered by a department of the financial intermediary or through linkages with private agricultural BDS provider.

Whenever an organized value chain could be identified, financing could be facilitated through a tripartite arrangement where contractual relations between the farmers, the buyer, and the financial institution serve as a substitute for formal collateral. Even in this case, cash flow analysis of the borrower should constitute the basis of setting installments so as to have borrowers be responsible for their debt and align repayment calendar with all possible incomes.

IT can be used to systematize to lower costs, secure operations, and innovate. Technology is certainly a very strong pillar of this new financing since it can lead

to significant breakthroughs. Hence, it could be considered as inclusive, holistic, responsible, and sustainable.

3 Potential Impact of New Agricultural and Rural Finance and Role of Major Stakeholders

In addition to realizing that modern agriculture could be good business for small farmers and, therefore, also a profitable investment for agribusinesses and for financial intermediaries, public donors, governments of developing countries, and large philanthropic foundations may also want to know if supporting this New Agricultural and Rural Finance will have meso and macro level impact and contribute to reaching aspects of the Millenium Development Goals. Agribusinesses and Financial Intermediaries will need to realize that modern agriculture is good businesses for farmers and also profitable investments for themselves. Public donors, governments of developing countries and large philanthropic foundations may want to know the impact of supports that they provide to this New Agricultural and Rural Finance, at meso and macro levels. All stakeholders are keen to understand how a successful endeavour in agricultural financing will contribute significantly to reaching aspects of the Millennium Development Goals.

3.1 Potential Impact at Micro, Meso and Macro Levels

At the micro level of rural finance, access to appropriate and adapted financial and non-financial services for small farmers will increase their incomes and enable savings habits, which in turn will smoothen households' and enterprises' cash flow and facilitate investment in productive means and living conditions. This will lead to a virtuous circle, out of subsistence into a modernized rural economy. Both livelihood and value-chain promotion have in common that it involves change management, transforming traditional and dependant individuals into rural entrepreneurs, making strategic decisions of diversification, of entering in contractual relations, of investment in agriculture as a business rather than a way of life and of managing the risks related to agriculture in a modern way. Empowerment could also be assumed as a major impact.

At the meso level, seasonal and permanent job creations for the youth in secondary towns and in value chains, are certainly a credible impact assumption. Better investment of remittances in MSMEs in the agribusiness sector should be considered if migrants see it as a good opportunity to set up a profitable business for themselves and a useful activity for the community. In turn, these jobs created and the investment from private sector leads to local economic development, sustaining local governments in countries where devolution is an important development policy.

At the macro level, successful agricultural and rural development built upon a private-sector-led approach would certainly have an impact on growth. And as this sector involves a majority of the population and most often the lower end segment, a spill over effect is likely. With appropriate policy, there should also be a significant impact on food security and food sovereignty for countries and regions that have been dependant.

3.2 Roles of Governments (Central and Local), Donors and Private Players in Supporting the New Agricultural and Rural Finance

Having a conducive environment is absolutely essential to transform this opportunity into growth, economic development and impact on people. For once, all stakeholders seem to agree on what is needed for success.

Role for Governments

On the overall framework, governments at the central level should show strong support to entrepreneurship, as well as any form of economic initiative developed by the private sector, be it from the rural households, the migrants, farmers' groups, or from companies of all sizes, national or foreign. Incentives to invest in rural areas, add value to local products, and to serve the domestic food market should be put in place in the form of temporary tax exemptions, facilitation in getting licence to operate, reducing administrative burden, etc.

Specifically, a rural and agricultural finance policy could set a clear vision, the objectives that the country want to achieve, and define roles for all players. It will certainly specify the role that the government want to play and how it wants to promote and achieve public-private partnerships (PPP). Such a rural finance policy is either absent in many countries or is more of a agricultural and rural development policy rather than a financial sector policy that takes the specific needs of rural and agricultural finance in consideration.

Among others, governments can invest in IT infrastructure to lower costs for banks and MFIs using technology to further penetrate the rural markets. Local governments could very well be one of the major beneficiaries of the outcome of rural and agricultural value-chain financing, if investments are made in villages and secondary towns, if permanent jobs are created, and if tax for productive infrastructure is paid It could also play a promoting role by creating a attractive environment for entrepreneurs to invest and settle their business locally. Did I understand? This could be through the mobilization of research laboratories of universities to work with firms on new products, or usage of vocational training centers to provide adapted skills that firms may need or facilitate apprenticeship. In value chain financing, setting up a local or regional venture capital in joint venture with private sector and banks is emerging as an innovative funding vehicle to encourage entrepreneurship.

3.3 Role for Donors

The most important role for donors is building capacities at different levels. The financial intermediaries, banks, or large MFIs that want to expand in rural areas and/or finance value chains, will certainly need expertise in product development, as well as in designing the most cost-effective delivery mechanism. Reviewing the procedures including operation and internal control will be crucial to secure transactions. Adjusting existing management information systems and up scaling them may also be essential for efficiency and productivity. Training of staff and training of clients is another area where funding is needed. Finally, the financial institutions may want to set up a separate department or window dedicated to rural and agricultural finance: supporting it and assisting the institution in designing it properly is also a good investment for future growth.

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CHAPTER 2

Food Security and a Holistic Finance for Rural Markets

Doris Köhn[1] *and Michael Jainzik*[2]

Investments in agriculture, particularly in smallholder agriculture in developing countries, are regarded as critical for meeting the food demands of a growing world population.[3] Improvements in agricultural finance, mainly in providing investment credit to farmers, are widely regarded as an important approach to stimulate production.[4] While this is certainly true, it is only part of the story. Agriculture-related physical and market infrastructure have been widely neglected in the discussion despite their immense relevance for making food available in developing countries – and as a precondition for farmers to produce at all.

In this chapter, we describe the investment and financing needs of every step in the food production and distribution chain: from farm to fork, from pasture to plate, or from barnyard to belly. Take your pick.

1 Commercialisation of Farming as an Opportunity

The global economic framework for agricultural production has changed significantly in recent years. Most importantly, after decades of stagnating commodity prices, prices for agricultural produce, processed as well as non-processed, have significantly increased and are expected to increase further. Population growth and increased demand for high-value food products – particularly in the big emerging markets – are the underlying factors that indicate a continuing challenge.[5] This

1 KfW, Director General Africa and Middle East.

2 Director KfW Office Windhoek.

3 The term "food security" is used loosely in this article. We do not refer to all dimensions of the 1996 World Food Summit's comprehensive definition of food security as "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life".

4 See for instance Doran, et al. (2009).

5 See for instance Chao-Béroff (2013).

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higher price level for agricultural goods that is likely to continue implies the opportunity for higher income for farmers in particular in developing economies since it promises higher economic returns for agricultural production.[6] Thus, investment in agriculture and modernization of production are rewarded. Indeed, they are more attractive today than they have been for many years.[7] At the same time, investments in agro-processing and related trade activities may become economically more attractive, which should boost investments.

However, these investment potentials in agriculture face two major bottlenecks: a lack of adequate infrastructure that connects agricultural production with markets, and a lack of finance for these investments. The lack of finance is not only a bottleneck for private investments in primary agricultural and processing, but also for the connecting infrastructure, both private and public.

We will explore these hurdles for agricultural production to reach consumer markets and to gain its full potential, and we will highlight the respective roles of the financial sector.

2 The Cross-Cutting Relevance of Transport Infrastructure

The relevance of physical infrastructure in rural areas, and how it can be financed, is an inexhaustible topic. Nevertheless, it has been neglected in the discussion around food security. Particularly, the relevance of (rural) transport systems for effective food production and efficient marketing to consumers has been tremendously underrated in the discussions. Discussing the development of agricultural production and of rural areas needs to re-address rural transport infrastructure – today more than ever in view of the changed global system of food production. Thus, the relevance of rural transport will re-appear in all sections of this chapter.[8]

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[6] "Small-scale farmers will not invest in boosting production beyond their personal needs unless there is something in it for them", Gouillou and Matheron (2011), p. 68.

[7] Although the authors believe that these incentives are generally positive and necessary to increase agricultural output to feed the world's population, on the flip-side of the expected higher returns of agricultural production there are obviously negative effects, too. Apart from potential ecological problems resulting from intensified production, the large-scale acquisition of fertile land by commercial investors may be the most prominent one. There are several reports, that such large-scale acquisitions have lead to the expulsion of small-scale farmers, and government and development financiers need to respond to such developments. This discussion shall not be deepened here. As a starting point for reading, we suggest Oxfam International (2011) and Deininger and Byerlee (2011). See also http://landportal.info/landmatrix, a project to maintain a public online database on large-scale land deals.

[8] Rural transport system does not consist of roads. The existence of transport services and the different modes of transport (including non-motorized transport) have to be taken into account. See Sieber (2011) for an introduction into the role of rural logistic chains for the integration of smallholders into emerging agricultural markets.

2.1 Food Which Is Never Produced

Many farmers in developing countries farm for subsistence. But many more farmers are profit-oriented entrepreneurs who sell their products to markets, and there is potential for subsistence farmers to become commercial farmers. These commercial farmers will only engage in production if they expect adequate earnings from their economic activities. Price levels are typically uncertain for most agricultural goods; they cannot be controlled by the individual farmer, and this uncertainty influences the farmers' production decisions what to grow or rise. Equally, the level of production output cannot be fully controlled by the farmer because of external agricultural risks such as weather and pests, although the farmer can apply strategies to mitigate these risks to a certain extent. The farmers' micro-level decision-making process under such uncertainty remains sketchy and is difficult to analyse on a generic level.

However, what is more clearly assessable for a farmer and is certainly reflected in farmers' decisions is the cost of transport of produce from the field to the next market.[9] Transport costs are typically not that fluctuating, although changes in prices for petrol (in case of motorised transport) and sudden deterioration of road conditions (e.g. through rainfalls or earth-slides) influence transport costs. Taking the price level at the market and the farmer's production costs as given, the transport costs remain the determining (and alterable) factor for the farmers' income.[10]

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[9] This is certainly not a new insight. In the mid 19th century, Johann Heinrich von Thünen, one of the first dedicated agricultural economists in the history of economic theory, explained the type of crops chosen by farmers as a function of distance to urban markets. See von Thünen (1910). Sieber (1999) finds that the circular structures of agricultural land use around towns – with the intensity of agricultural production decreasing with further distance to the market – that have been observed by von Thünen in pre-industrialized Germany can be identified regularly in today's cropping patterns in Sub-Saharan African countries.

[10] Different studies have shown that farmers usually do not have bargaining power to shift the transport costs to other parties: The price at the urban buyer markets is typically a fixed reference with the transport costs to these markets being levied onto the farmers lowering the price at farm gate. See for instance Mkenda and Van Campenhout (2011) in their study about Tanzania, p. 9. The share of transport costs in the price at urban markets is often significant. Mkenda and Van Campenhout (2011), p. 16, report the traders' transport costs from a village to a nearby town (25 to 75 km distance) as around 10% of the farm-gate price (without the traders' margin). A study in the Atlantic zone of Costa Rica reports that the farm-gate prices amounts to approx 40% (papaya), between 50% and 55% (banana, cassava and young maize) and 70% to 78% (Cocoyam) of the respective selling prices at the urban farmer market, with the difference being presumably made up from transport costs and margins of traders and transport companies involved. See Hoekstra (1996).

Box 1: Some Examples for Evidence of the Positive Effect of Improved Road Connectivity on Agricultural Production

There is substantial evidence that investments in roads and road connectivity have a positive impact on agricultural productivity and output in developing countries.[11]

Ex-post evaluations of KfW-financed transport projects have illustrated the contribution of roads to stimulate food production. The asphalting of a road in Nepal's Dhading Besi district that connects 150,000 people to the national road system has resulted in an increase of vegetable production in the area from around 12,200 tons to almost 50,000 tons. The main, underlying reason is the reduction of price for cargo haulage by two thirds due to the road improvement.[12] A similar result is documented for a road investment in Chad where the construction and improvement of two main gravel roads that connect the regions Ouaddai and Wadi Firi to the national road network contributed to a tripling of the peanut production.[13]

An econometric study across 21 Sub-Saharan African countries has revealed that there is substantial scope for increasing agricultural production by investing in road infrastructure and thereby increasing accessibility of markets:[14] Total crop production relative to potential production turned out to be approximately 45 percent for areas within four hours travel time from a city of 100,000, whereas in contrast total crop production relative to agronomic potential is only about five percent for areas more than eight hours travel time from a city of 100,000 people.

An econometric analysis on the effects of road connectivity in Madagascar on intensity of agricultural input use, crop outputs, and household income gives evidence that geographical remoteness negatively affects agricultural productivity and incomes at the household level.[15] An econometric analysis in China also showed the positive impact on poverty reduction by public investment in roads.[16] Another econometric modeling illustrates that in DR Congo the road access to cities and ports is highly relevant for seizing the country's huge agricultural potential.[17]

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11 The strengthening of rural road systems has positive impacts that go far beyond agriculture and plays a central role in overall poverty reduction. See Faiz (2012), pp. 15-23.

12 See KfW (2005), p. 22.

13 See KfW (2005), p. 28. Before the investment, both named region where only connected via one earth road that was impassable during the rainy season.

14 See Dorosh, et al. (2009).

15 See Stifel and Minten (2008).

16 See Fan et al. (2002), p. 44: "Government expenditure on rural infrastructure also made large contributions to poverty reduction. These impacts were realized through growth in both agricultural and non-agricultural production. Among the three infrastructure variables considered, the impact of roads is particularly large. For every 10,000 yuan invested, 3.2 poor are lifted above the poverty line. Roads, thus, rank third in poverty-reduction impact, after education and R&D [research and development]".

17 See Ulimwengo et al. (2009).

With a better road infrastructure, inputs may also reach the farm more easily and stimulate production: seeds and fertilizer, agro-consulting, machinery maintenance services,[18] seasonal workers and – financial services. The authors are not aware of any empirical study on to what extent road improvements have led to an increase of financial penetration in rural areas. But the relation is obvious. A decent road connection is vital for any bank branch to work properly (cash transport to and from central branch, monitoring of credit clients, etc.). With regard to the bank-customer interaction, particularly for credit extension, physical access is crucial. Bank staff needs to visit the clients' premises for analysis, and the credit client needs to return to bank branches or other facilities to pay regular installments. The travel cost of rural bank clients – both in cash and time – typically constitutes a significant portion of the cost of taking a credit from the borrower's perspective.

The expansion of mobile banking, i.e. the use of cell phones to connect to bank accounts or to store money on the cell phone provider's account and to endorse transactions, may provide a viable alternative for some of these services and may give some relief to the transport cost issue where there is no bank branch. However, this is likely to reduce mostly the cost of money transfers (between bank and customer, and between customers). In processes between bank and client that require closer interaction, like for instance credit analysis and credit monitoring, mobile banking is not likely to move the financial frontier for too far into the rural economy.[19]

2.2 Post-harvest Losses as a Critical Factor for Food Security

Typically, discussions about income generation for farmers as well as food security concentrate on (increasing) agricultural production and the necessary on-farm investments. This does not give the whole picture. Significant losses of produce are occurring after production: Post-harvest losses, usually understood as measurable quantitative and qualitative food loss in the post-harvest system,[20] are estimated and

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[18] Dorosh et al. (2009) in a study across 21 African countries suggest that the adoption of high-input agricultural production technology is negatively correlated with travel time to urban centres (although adoption rates are generally low throughout most countries of Sub-Saharan Africa).

[19] Compare Westercamp (2013).

[20] See de Lucia and Assennato (1994). The "post-harvest system" contains cutting and on-field handling, threshing, drying, milling, storage and transport. Also food discarded in supermarkets (due to substandard appearance like blemishes or misshapen produce) or at home (being left on the plate or due to passed expiry dates) are often discussed as post-harvest loss. See Hodges et al. (2011). Losses at production, post-harvest and processing stages in the supply chain are often referred to as "food losses" whereas losses in retail and in connection to final consumption are often called "food waste", which conceptually relates to retailers' and consumers' behaviour (see Parfitt et al., 2010) and is often associated also with a moral appeal. When we use the term "food loss" or "post-harvest loss" in this article we roughly follow Parfitt et al. (2011) and use

recorded to be between 5% and 70% of original quantity in developing countries.[21] Thus, food losses have a significant impact on food security, both in terms of available quantities, and in terms of (potential) effects on the price of food.

In Western economies a tremendous amount of food is wasted in supermarkets or in the consumers' households (in the USA 9% and 17%, respectively).[22] This finding is not merely a technical issue, but is often associated with a moral appeal since the waste in supermarkets is partly due to the fact that consumers are reluctant to buy vegetables with marks or wrinkles, and losses in the fridge are partly due to uncontrolled or thoughtless buying patterns.

In developing countries, in contrast, losses in retail trade or in households are much lower. Here, the main part of loss is caused by biological spoilage in earlier steps of the production and distribution chain, for instance due to the (delayed or general) unavailability of adequate harvesting equipment, due to lack of adequate refrigeration in transport and storage, due to storage pests facilitated by unsafe storehouses, or to damages due to a lack of adequate packaging. See Table 1 for the different technical reasons for quantitative and qualitative food losses. (Note that some forms of initially qualitative losses like rot may ultimately lead to quantitative losses.)[23]

Strategies for reducing post-harvest losses are manifold, but the issue is not prominent on the political agenda.[24] The approaches to reduce post-harvest losses

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it in reference to the agricultural post-harvest system and trade structures insofar as these losses are mainly due to a lack of (investment in) adequate technologies and its competent use. "Food waste" in households and retail stores we understand as destruction of food due to human consumption behaviour which is not dealt with in this article.

[21] See Hodges et al. (2011), Kader (2005) and Gustavsson et al. (2011). Typically, post-harvest losses are higher in more easily perishable produce like fruits, tuber, vegetable, and fish, and less in grains. However, in many developing countries post-harvest losses in grains can amount up to 35%, like for instance maize in Eastern Africa. See Hodges et al. (2011), pp. 40-41, based on APHLIS statistics (www.aphlis.net). Compare also Gustavsson et al. (2011) who give loss data on different food categories by regions. The level of post-harvest losses is also influenced by the production quality, i.e. good seeds and healthy plant growth can make produce more resistant to deterioration. Typically, production quality is also comparatively low in developing countries.

[22] See Hodges et al. (2011), pp. 40-41. Hodges et al. also quote other studies that report similar levels for other countries.

[23] Next to technical causes for food losses, often connected to inadequate equipment due to sub-optimum investment, there are also cases of policy-induced food losses: Regulatory quality standards (grading systems) may demand the dumping of food. Fruits and vegetables are also withdrawn from the market and destroyed in order to protect prices. See Guillou and Matheron (2011), pp. 47-48.

[24] The discussion of post-harvest losses appears to be more a discussion among technical experts (logistics and packaging experts, veterinarians and the like) rather than a discussion in the broader policy sphere. Only recently, there have been some publications directed towards the broader public, for instance Stuart (2009). The first and until now

range from purely technical solutions (investments and altered processes) to regulatory measures.[25] Most of the approaches to reduce post-harvest losses call for investments, notably in transport facilities, storage, and packaging. But there is also a need for investment in human resources.[26]

Table 1. Examples for the technical factors of post-harvest losses on the different post-harvest levels. Source: based on Guillou and Matheron (2012)

Nature of Losses	**Position in the Post-Harvest System**	**Examples**
Quantitative Losses		
Accidental	Harvest, transport, handling	Dropped or torn bags, spillage
Due to handling with tools	Harvest, threshing, transport, storage processing	Breakage of grains
Damage caused by birds	Pre-harvest drying	In-field drying of standing crops
Damage caused by rodents	Drying, transport, storage	Rats, mice
Damage caused by insects	Drying, transport, storage	Larger corn borer
Qualitative Losses		
Physical conditions	Harvest drying, storage	Heat, cold, humidity
Traces of birds and rodents	Drying, storage	Excretions, feathers, hair
Traces of insects	Drying, storage	Excretions, larvae, nets
Damage caused by micro-organisms	Drying, transport, storage	Aflatoxin contamination, rot due to fungal decay
Respiration and transpiration	Storage, transport	Perishable products
Handling	Throughout entire chain	Bruising leading to rot

most high-level treatment of post-harvest losses was the 1974 World Food Summit that gave rise to an ambitious programme entitled "Prevention of Food Losses" designed to reduce global food losses by 50 per cent within 10 years. See Guillon and Matheron (2011), p. 61. The authors are not aware that this reduction by half has ever been measured, and we have doubts that the goal has been reached.

[25] Kader (2005), Hodges et al. (2011) and National Academy of Sciences (1978) provide an overview about different approaches. See also Guillou and Matheron (2011), pp. 47–57 and pp. 66–73.

[26] See National Academy of Sciences (1978), pp. 159 et seqq.

The following Figure 1 relates the activities in the post-harvest system to the different actors that would need to invest in physical or human capital in order to achieve higher process quality and reduce losses.

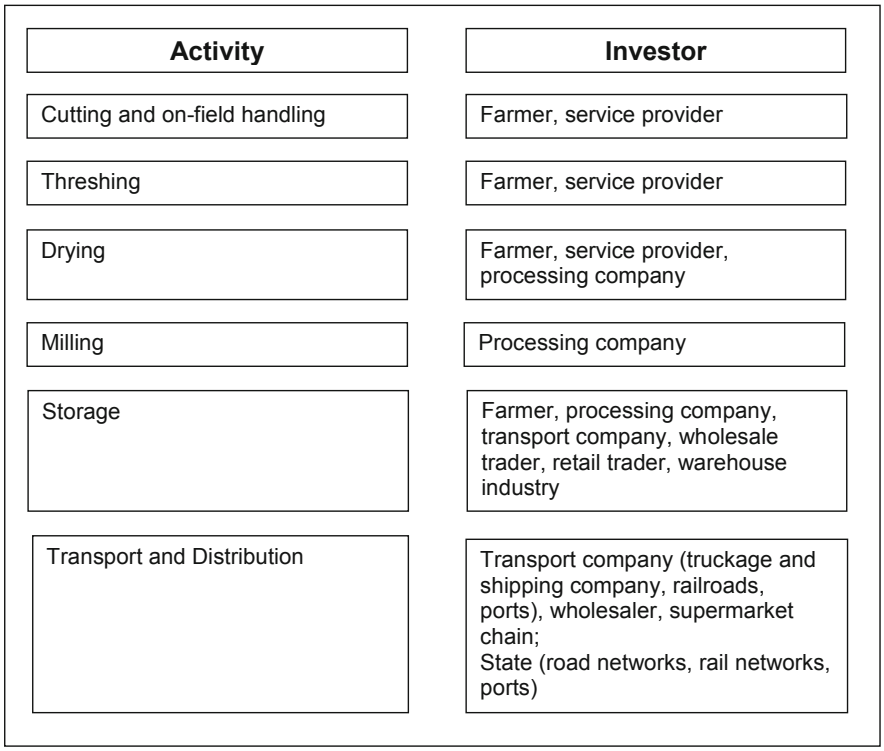

Fig. 1. Activities in the post-harvest system and related investors

As Figure 1 illustrates, the high need for investments that facilitate an efficient and effective post-harvest process calls for a range of different investors. These investments need to be undertaken both by the state or communities (road infrastructure, again, and possibly community-based storage facilities) and by private companies, to refer to the main distinction. It needs to be highlighted that post-harvest investments of the private sector go far beyond the often quoted "processing companies" that many policymakers favor. Also, sectors that are often pointed at because of their "unproductive character" – transport and trade – play a major role in reducing post-harvest losses in developing countries. It shall also be noted, that not only long-term investments are needed. Often, for instance when it comes to timely availability of harvesting machines or access to safe threshing and milling, a lack of working capital can be an issue.

2.3 Post-harvest Losses as a Factor for Farm Income

Applying technologies to reduce post-harvest losses has a positive impact on the quality and quantity food supply to the markets and therefore a positive impact on food security. An increased supply of food will, in general, contribute to lower the cost of food for the benefit of the urban and rural poor.[27]

Depending on the activity – if on-farm or off-farm in the farmers' range of activities – a reduction of losses directly influences the farmers' income due to an increased volume and quality of produce he or she can sell. While the gains from reducing post-harvest losses can be significant, there are also costs associated with those efforts. Thus, the investments to reduce post-harvest losses must have a positive return to be attractive for a farmer or a group of farmers in case of a shared use.[28] Whereas the application of some technologies of reducing losses on the farm (like on-field handling, cutting, drying or on-farm transport and on-farm storage) can also benefit subsistence farmers, all technologies related to marketing produce (like for instance transport to markets, packaging) will increase income only for commercial farmers who sell their surplus.[29]

2.4 Efficiently Organised Value Chains Can Reduce Post-Harvest Losses

There is some evidence that a lack of inter-linkage between the different steps of the post-harvest system contributes to post-harvest losses. Losses in storage, for in-

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[27] See Zorya el al. (2011), pp. 19-20.

[28] Zorya et al. (2001), pp. 21-35, give several examples of low-tech and low-cost post-harvest loss reduction technologies for cereals.

[29] The authors are only aware of one study that estimates or measures the impacts of reduced post-harvest losses on income and profit of farmer households. Fischler et al. (2011) evaluate the POSTCOSECHA programme in four Central America countries that consisted of a massive stimulation of production and use of small galvanized metal silos for rural households. The study shows that subsistence farmers keep almost the entire production for covering own consumption needs and by using the metal silo they have increased their food security by 30 to 35 days per year. This effect of safely stored grain (mainly maize) in metal silos for later consumption is considered the most important aspect (savings from less need to buy grain and increased resilience). Farmers with market access, on the other hand, additionally benefitted from the metal silo since they have increased their income by selling parts of their safely stored grain not at harvest time but later during the season when the prices are higher. The average additional cash income generated in this case is reported at 90 US$/year (or 5% of the average annual cash income per family of 1800 US$) and equals approximately the actual price of a 545 kg silo. This means that the study does not measure the isolated income effect of the reduced post-harvest loss only, but the overall effect which is intermingled with effects resulting from deferred sales. In addition to the benefits for the farmers, the analysis reveals positive income effects for the around 800 to 900 small-scale tinsmiths producing the silos, and it argues that the programme has significant price stabilizing effects in the region.

stance, may become larger because of longer storage times because of a lack of timely processing or other sales. Unavailability of transport combined with lack of storage on farm level may result in produce exposed to the risk of outside drying longer than technically necessary. Efficiently organised value chains can reduce such post-harvest losses. This happens mainly through a better organisation of marketing and of exchange processes between the actors in the agricultural value chain.[30] Such governed marketing efforts can take quite different forms; for storable grains and oilseeds they may include inventory credit schemes and warehouse receipt systems.[31] Such schemes can facilitate the quick removal of the crop from the field and storage in safe and loss-minimising warehouses and silos.[32] Adequately governed marketing structures may also save farmers from the necessity to sell growing crops before harvest in order to secure cash-flow, thus providing a more reliable income source.[33] Accordingly, so-called value chain financing schemes that support organised value chains may contribute to reducing food losses.[34]

Box 2: The Ambivalent Role of Modern Food Distribution and Marketing Systems

The food distribution systems in developing countries are rapidly changing, mainly under the influence of urban, Western-based lifestyle models: Large retail chains and modern supermarkets are gaining prevalence over traditional markets and small-scale retailers selling local produce. In Brazil, for instance, around 70% of food is distributed in large supermarkets, up from only 10% 30 years ago.[35] From the perspective of reducing post-harvest losses, this development carries ambivalent effects: Modern supermarkets and retail chains may organize marketing of food more efficiently, and can reduce post-harvest losses in storage and transport. However, they appear to increase food losses again,

30 See Hodges et al. (2011).

31 For a discussion of agricultural value chains and value chain finance, see Swinnen and Maertens (2013).

32 See Hodges et al. (2011) and Coulter and Shepherd (1995).

33 Market structures for primary produce are often characterized by monopsonistic or oligopsonistic structures, i.e. there is only a limited number of buyers in an area that buy the harvest from the farmers. This results in the relatively high bargaining power of these traders since farmers have little alternative. Organized trade structures with long-term obligations on both sides are in principle suitable to reduce such bargaining power since plights of farmers shall not be used for exercising pressure on them. De Schutter (2010) examines the subject of bargaining power in global food supply chains, its potential abuse by dominant buyer, and the relation to competition law.

34 See Miller and Jones (2010) for a description of different approaches of value chain financing. See also Swinnen and Maertens (2013) in this volume.

35 Guillou and Matheron (2011), p. 23.

because they tend to display and sell only goods of superior aesthetic quality because of customer preference, which leads to a discharging of eatable food. Also, the tendency to sell pre-prepared food in modern supermarkets is likely to increase food waste. Which effect will dominate remains currently unclear due to a lack of studies carried out on food losses in modern urban trade and consumption structures of developing countries.[36]

To summarise the main findings how to reduce farm-to-fork bottlenecks:

1. Increasing food supply is more than increasing agricultural production output. A significant amount of the food produced on the farm is lost or deteriorates afterwards. This happens on the farm, for instance while threshing, drying, or packaging the food, but to a significant extent after the produce has left the farm, for instance in later value chain steps of processing, transporting or trading the goods. In order to increase the security of food supply, all steps and processes between farm and consumer need to be understood and strengthened.

2. Public investment in rural road infrastructure is key. Road infrastructure forms the economic basis for practically all post-harvest activities because they are all related to transporting produce to markets or processors, or to preparing produce for these steps. Road infrastructure also influences the farmers' decision what crop to produce, or if to produce at all for the market (because markets might be physically unreachable). Thus, innovative approaches to how to finance rural road infrastructure (both construction and maintenance) need to be developed.

3. Reduction of post-harvest losses requires investments by different private actors. The above-listed investments of the private sector in processing, transport and trade can be facilitated by providing capital, i.e. investment and working capital loans, which is typically provided by banks. The clients in these sectors typically carry a different risk profile as compared to urban or non-agriculture related businesses. And banks face a similar challenge with clients in agricultural processing and trade as they face with crediting farmers, since the different actors in the value chain face the same or similar specific agricultural risks.[37] Thus, financial institutions need to assess and manage co-variant risks characteristic for agricultural finance, including the different value chain actors. We will explore this later. So-called value-chain financing schemes along organised value chains that govern several post-harvest steps can contribute to the financial sector by reducing post-harvest losses.

[36] Compare Guillou and Matheron (2011), p. 59.

[37] See Maurer (2013) for a discussion of risks involved in crediting farmers and the agricultural value chain.

3 The (Potential) Contribution of the Financial Sector

As developed above, investments by different types of investors are relevant in order to fuel an efficient and food-loss minimising chain from pasture to plate: The state needs to invest in rural public infrastructure. Different economic sectors are involved in the post-harvest system, and different (private) actors operate in organised value chains. They all need access to finance in order to encourage rural investments in agriculture and beyond.

Why do banks and other financial institutions not finance these activities to the extent needed?

The state. In order to boost agricultural productivity and reduce post-harvest losses, the public sector needs to invest, first of all, in public transport infrastructure, mainly in the rural road network. Rail transport and sea ports are relevant for countries that export agricultural produce. For financing such expenditure, public finance typically uses its instruments such as taxes (as well as royalties, import and other duties) and borrowings.

We do not want to enter into the discussion of public finance here. However, we would like to point to the role of municipalities and other regional administrative levels. Not least driven by policies of decentralization, local authorities become a more important player in providing and maintaining local infrastructure like for instance rural roads. The public finance system does not always provide the necessary funding for the responsibilities transferred to the communities.

But apart from investing into classic public goods like rural roads according to their legal responsibilities, we see municipalities investing in specific commercial support facilities in order to strengthen local economic growth. Examples for such services are serviced market spaces, municipal storage facilities, and municipality-run ferry-boats or river quays. For such income-generating activities, the outsourcing of services, concession models, or other forms of PPP may be a vehicle to mobilise private investment and engage the financial sector.

Primary agricultural production. Banking to farmers may be more difficult and complex than granting finance to other economic sectors, but there is no proof that agricultural finance is more risky than banking in others sectors.[38] Until the 1980s, the predominant approach in agricultural finance was the provision of farmer credit with subsidized interest rates, particularly via specific state programmes or state-owned agricultural banks. This approach has proven unsustainable and has regularly caused the contrary of what should have been achieved: They excluded rural poor from financial services, instead of making them sustainable and beneficial for all.[39] By now, it has become widely accepted that the approach of

[38] "No data have been found to confirm the argument that agricultural loans are more risky than others […]" Meyer (2011), p. 46.

[39] There are hundreds of studies on this subject. The first publication that contributed to an abolishment of the concept of subsidized and targeted credit for the promotion of ag-

strengthening the financial system and promoting strong and efficient financial intermediaries with interest in rural clients will lead to higher-quality financial services for the poor and other previously excluded.[40]

For a couple of years, we have seen several examples of well-managed and strategically positioned financial institutions which service farmers in developing countries, including smallholders.[41] In particular, the financial institution's ability to perform a succinct but useful credit assessment of farming businesses with its peculiarities and an institutional ability to manage risk exposure concentrated in one sector with the agriculture-specific external risks (particularly weather, but also pests and market risks) have been critical for success.

Despite these successes, however, there is still a long way to go before service levels of the financial sector to the farming communities are satisfactory in terms of quality and quantity.

Agricultural service providers and traders. Agricultural service providers, like traders for input and machinery, commodity traders, or providers of ploughing or transport services are traditionally better served by banks, compared to the farmers themselves. Usually they are bigger in size (leading to economically more attractive, larger credit amounts); they are often more professionally run (decent bookkeeping for banks to analyse); they are often located in more urban settings (thus more easily accessible); and they often own – in contrast to farmers – easily sellable collateral (like cars, stock or urban real estate). These factors make it, in principle, easier for banks to serve these actors.

However, in terms of risk-management banks face a similar challenge with clients in agricultural processing and trade as they face with farmers. Both types of customers are exposed to same specific agricultural risks:[42] When draughts or pests lead to a reduction of produce quantity in a region, there is also less produce

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ricultural production was United States Agency for International Development's 1973 "Spring Review of Small Farmer Credit". See USAID (1973). Another ground-breaking publication was Adams et al. (1984) with several important studies on the subject orchestrated by the Rural Finance Group in the Agricultural Economics Department at Ohio State University.

40 As an overview for the transition from the old subsidized credit paradigm to the new financial system approach see Vogel (2006).

41 Several of the originally urban-focused microfinance banks of the ProCredit network, as one example, have invested more than 15% percent of their credit portfolio in the agricultural sector (Ghana, Nicaragua, Ecuador, Ukraine, Serbia, Rumania). See the different banks' annual reports (2011), accessible under www.procredit-holding.com. Another example of a commercially oriented microfinance bank having entered the rural and agricultural client segment successfully is AccessBank in Azerbaijan. See the contribution of Jainzik and Pospielovsky (2013). Meyer (2013) also refers to a number of examples. Both in this volume.

42 See Maurer (2013) for a discussion of risks involved in crediting farmers and the agricultural value chain.

to be put into tins by processors and to be marketed by traders. Thus, financial institutions need to carefully assess and professionally manage co-variant risks characteristic for agricultural finance, including the different value chain actors, in order to allow for the full potential of finance provision for the sector. Most financial institutions are still far from such professional management of specific agricultural risks.[43]

The efficiency imperative. A core challenge of serving the agricultural sector and its related actors is the fact that the agricultural sector is essentially rural. Clients typically generate lower unit volumes compared to urban markets (both in credits and in savings), clients are more distant to physical branches, and branches are more distant to bank headquarters and to labour markets for qualified bank staff. These factors make service provision to rural areas more costly. Thus, in order to provide services to the countryside cost-effectively, banks need to be highly efficient. Discussions about cost efficiency in reaching the clients often focus on technological solutions, like cell-phone banking as has been mentioned before. But any technological approach needs to be embedded into a clear strategic view how to service rural markets, which may include a distinction between services than can be offered efficiently, and others that shouldn't be offered by the respective financial institution.[44] Product designs and of process organization need to fit to client needs in order to reach out into rural areas. Core strategic questions that financial institutions need to answer are for instance: Which clients can we serve, and which may remain excluded from our service? Which products can gain enough scale in rural areas in order to be distributed efficiently? What degree of standardization and simplicity of products is adequate in rural areas so that less literate clients can still understand, and potentially less qualified bank staff can still explain to them? What is the best distribution approach for our products? Individual lending or group-based approaches where parts of the distribution costs are passed on to village groups?

In this context, cross-selling opportunities for financial institutions have a critical influence on the cost-income-ratio; the ability to use infrastructure (like branches, cash points, etc.) not only to extend credits, but also for savings services, money transfers and other services which can help banks to make best use

[43] For the different risk-management approaches, see Maurer (2013). To a certain extent, financial institutions can manage specific agricultural risks and limit its potential negative effects internally by applying exposure limits, diversification rules for the institutions portfolio, diversification requirements for the farming business and other measures. If the risk-bearing capacities of financial institutions are exhausted despite of the application of such measures an outplacement of risks can enable them to enlarge agricultural lending without exposing the institution to inadequate risk levels. For the role of agricultural insurance in developing countries see Herbold (2013), for the potential role of structured finance see Hartig et al. (2013), both in this volume.

[44] Some services, like for instance payment services, might be better offered by non-banks, like mobile telecommunications companies.

of its infrastructure.[45] Thus, traditional, specialised agricultural banks, often providing only credit, are likely to be less cost-effective than full-service banks that provide a wider set of services to a wider range of customers, i.e. not only farmers but also other clients who live in the countryside.

We feel that many of (micro) finance institutions lack the necessary rigour in defining and designing their product offers and the corresponding process organization to provide services to rural communities with the outmost efficiency. Applying such rigour may result in painful choices, since it may well lead to consciously not meeting some demands on parts of the rural population. But the lack of efficiency in process organization is the main impediment to the rural penetration of financial services.

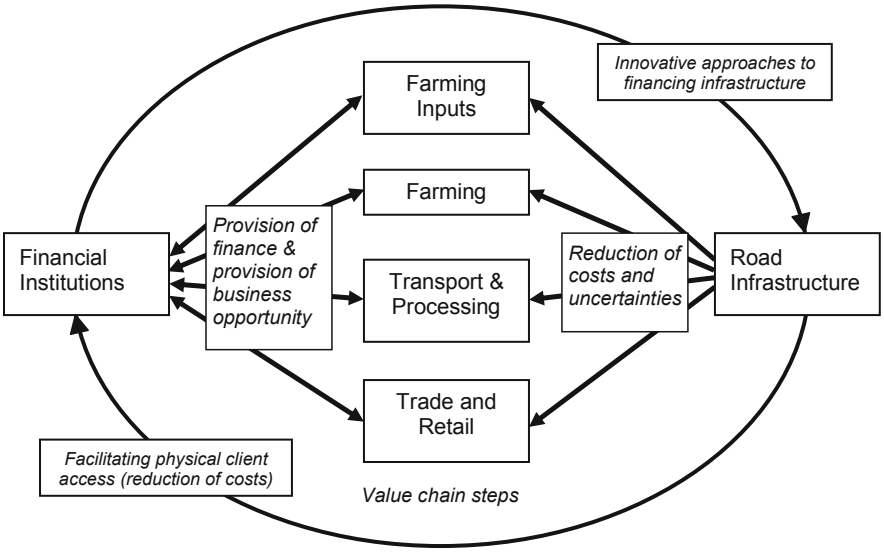

Fig 2. The re-enforcement potential between holistic rural finance, road infrastructure and the agricultural value chain

[45] Hartarska et al. (2009) have done an econometric analysis over 750 microfinance institutions worldwide, concluding that the provision of both savings and credit leads to significant economies of scope, i.e. potential cost saving effects. They found that scope economies would not necessarily come from lower costs of capital due to deposit collection. Scope economies seem to be a result of fixed cost distribution and costs interaction among the different products. However, it also turned out that reaching scope economies seems to be harder in rural settings compared to urban areas.

4 Conclusion

In order to develop agricultural and rural finance into a relevant tool to contribute to food security, a holistic approach is needed that addresses not only the farmers' need for finance, but also the investment and finance needs of further actors in the value chain. To include these actors is particularly important since they can make an important contribution to reduce the food losses that occur after harvesting, thus helping to make more food available in the market which potentially may also bring prices down for consumers.

The role of the state, particularly for investments in rural transport infrastructure, needs to be re-emphasized. Getting infrastructure conditions right contributes significantly to both food production and reduction of post-harvest losses.

The financial sector has not done its homework yet: Innovative approaches how to employ public-private partnerships in order to finance public goods and joint service provision for actors in the agricultural value chain remain limited. Only a limited number of banks and microfinance institutions have so far developed and implemented adequate risk assessment and risk management tools in order to increase lending to farmers and other actors in the value chain which all are subject to specific (covariant) agricultural risks. And only a limited number of banks and microfinance institutions have reached a level of efficiency in process organization – which is interlinked with product design – that allows for deeper outreach into rural areas.

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PART II:

Institutional and Process Innovations in Serving Rural Clients

CHAPTER 3

Finance Through Food and Commodity Value Chains in a Globalized Economy*

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1 Introduction

The growth of value chains and the associated spread of quality standards has triggered a vigorous debate in the development community over their impacts on poor producers in developing countries.[3] Quality requirements in value chains affect farms through several channels. First, ever-more rigorous public quality requirements in richer countries are imposed on imports and consequently have an impact on producers and traders in exporting nations (Jaffee and Henson, 2005; Unnevehr, 2000). Second, global value chains are playing an increasingly important role in world food markets and the growth of these marketing channels, which are often vertically coordinated, is associated with increasing quality standards (Swinnen, 2007). For example, modern retailing companies increasingly dominate markets in fruits and vegetables, including urban markets in many poorer countries, and have begun to set standards for food quality and safety in this sector wherever they do business (Dolan and Humphrey, 2000; Henson et al., 2000). Third, rising investment in processing in developing countries also has induced demand for higher-value and higher-quality commodities from local producers in order to serve the high-end income consumers in the domestic economy or to minimize transaction costs in their regional distribution and supply chains (Dries et al., 2004; Reardon et al., 2003).

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3 The arguments and empirical evidence in this paper cover areas that are traditionally referred to as "developing countries", "transition countries", and "emerging countries". Many of the arguments are valid across these regions; where they are not, the differences will be specifically identified.

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The development implications and the impact on small farmers has been actively debated. On the one hand, agriculture in developing countries, and exports of agricultural commodities, are seen as a very important potential source of propoor growth. On the other hand, tightening food safety and quality standards, both from private and public sources, strongly affects domestic and international trade, and value chains (Jaffee and Henson, 2004). Some have argued that they reinforce global inequality and poverty as: (1) they introduce new (non-tariff) barriers to trade; (2) they exclude small, poorly informed, and weakly capitalized producers from participating in these high-quality supply systems; and (3) because large and often multinational companies extract all the surplus through their bargaining power within the chains (Augier et al., 2005; Reardon and Berdegué, 2002; Unnevehr, 2000; Warning and Key, 2002).

A key concern is that the process of vertical coordination will exclude a large share of farms, and in particular small farmers. Three reasons are mentioned for this. First, transaction costs favor larger farms in value chains because it is easier for companies to contract with a few large farms rather than with numerous small ones. Second, when some amount of investment is needed in order to contract with companies or to supply high-value produce, small farms are often more constrained in their financial means for making necessary investments. Third, small farms typically require more assistance from the company per unit of output. The concern of the exclusion of small farmers is often voiced and raised in studies on the impact of the growth of high value chains, which regularly emphasizes the shift to larger, preferred suppliers and the exclusion of small farms (e.g. Reardon and Berdegué, 2002).

However, there is considerable debate and uncertainty about the validity of these arguments, and more generally about the welfare implications of high value chains (Swinnen, 2007). First, while quality and safety standards indeed make production more costly, at the same time they reduce transaction costs in trade, both domestic and internationally. In other words, besides barriers, standards can also be catalysts for trade (Maertens and Swinnen, 2010). Second, recent empirical studies show that smallholder participation in global value chains is much more widespread than initially argued and that the situation is actually very diverse, as we shall see later in this chapter. Small farmers are dominant participants in modern value chains in countries and sectors as diverse as domestic horticultural value chains in Asia (e.g. China), cotton chains in Central Asia (e.g. Kazakhstan), horticultural exports from Africa (e.g. Madagascar) and various value chains (dairy, barley) in Eastern Europe (e.g. Poland). There are also cases where farm structures in modern value chains are mixed, for example in vegetable exports from eastern Africa (e.g. Senegal); or where large farms dominate, such as in fruit and vegetable value chains in southern and eastern Africa, and grains and oilseeds in the former Soviet Union (e.g. Russia and Kazakhstan). Recent evidence also shows that important changes may occur over time within a chain, but the direction is equally diverse: small farmer participation declined in some cases (horticultural exports in Senegal) and increased in other cases (tea in Sri Lanka).

There is less evidence on the third issue, which is the rent distribution within these value chains. Empirically, most studies have focused on the exclusion issue and very few studies actually measure welfare, income, or poverty. The few studies that do measure welfare effects find positive effects for poor households in developing countries that may participate either as smallholder producers or through wage employment on larger farming companies (Maertens and Swinnen, 2009; Maertens et al., 2011; Minten et al., 2009). What is remarkable is that these strong benefits occur in several of these cases despite the fact that smallholders and rural workers face monopsonistic processing, trading, and retail companies.

To understand these welfare effects it is important to realize that the introduction of higher quality requirements has coincided with the growth of value chain finance (VCF) and technology transfer (Dries et al. 2009; Miller and Jones 2010, Quiros 2007; Swinnen 2007). Contracts for quality production with local suppliers in developing countries not only specify conditions for delivery and production processes but also include the provision of inputs, credit, technology, management advice, etc. (Minten et al., 2009; World Bank, 2005). The latter are particularly important for local suppliers who face important local factor market imperfections – another key characteristic. In particular, imperfections in credit and technology markets are typically large, which implies major constraints for investments required for quality upgrading, especially for local firms and households that cannot source from international capital markets. However, the enforcement of contracts for quality production and value chain finance is difficult in developing countries that are often characterized by poorly functioning enforcement institutions. These enforcement problems can add significantly to the cost of contracting and may prevent actual contracting from taking place and inhibit value chain financing.

The first part of this chapter discusses the development of value chains and the inclusion of small farmers. The second part discusses the development of value-chain finance within these value chains.

2 Increased Importance of Value Chains

The growth of value chains in emerging and developing countries is related to two factors: the growth of demand for high-value products in local markets, and increased exports of high-value commodities to high-income countries.

First, domestic consumption of high-value crops such as fruits and vegetables in developing countries increased by 200 percent in 1980–2005, while consumption of cereals stagnated during that period. This growth relates to increasing incomes and urbanization, and is reflected in the rapid growth of modern food industries and retail chains ("supermarkets") in urban market segments (Reardon et al., 2003). Modern retail companies have expanded rapidly throughout the developing world and have set high standards for food quality and safety (Dolan and Humphrey, 2000; Henson et al., 2000). Important factors behind the spread of modern food industries have been liberalized investment policies and the associated inflow of Foreign Direct Investment (FDI) in developing country food sectors.

FDI stocks expanded from less than 10 percent of GDP in the early 1990s in most developing and emerging countries to 25 percent in 2005 in Southeast Asia and the transition countries, and 30 percent in Africa and Latin America. In the majority of African countries the agri-food sector accounts for a vast share of FDI inflows (UNCTAD, 2010).

Second, high-value food exports – including fruits and vegetables, meat and milk products, fish and seafood products – from developing countries increased more than 300 percent in the period 1980–2005 and now constitute more than 40 percent of total developing country agri-food exports (World Bank, 2008). The growth in high-value agricultural export products from developing countries has been much faster than the growth in traditional tropical exports such as coffee, cocoa, and tea, which decreased in overall importance (Figure 1). For Asia, the shift toward non-traditional and high-value exports started earlier, but for Africa, Latin America, and the Caribbean the decreasing importance of traditional crops and the growth in fruits and vegetable exports mainly took place over the past two decades.

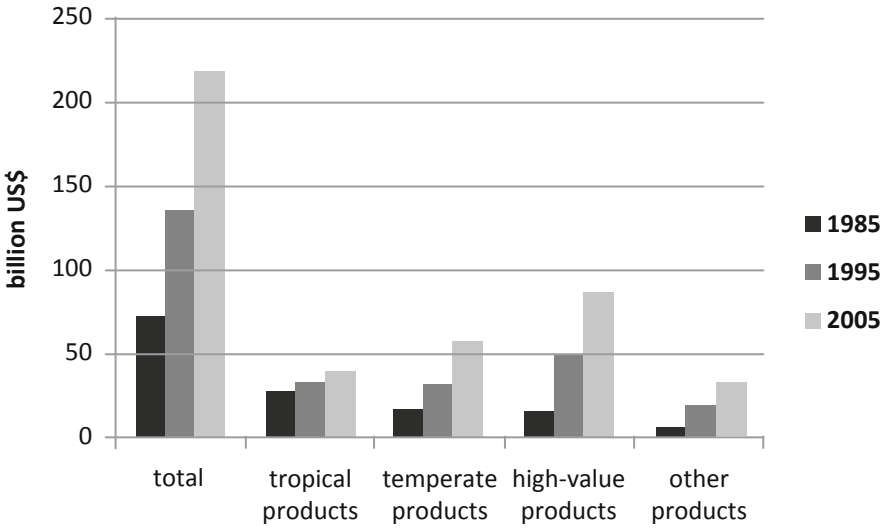

Fig. 1. Changing structure of developing countries' agro-food exports, 1985–2005[4]
Source: Maertens et al. (2009)

[4] *Tropical products* include coffee, cocoa, tea, nuts and spices, textile fibres, sugar, and confectionary. *Temperate products* include cereals, animal feed, and edible oils. *High-value products* include fruits, vegetables, fish, seafood, meat, and meat products, milk and dairy products. *Other products* include tobacco and cigarettes, beverages, rubber, and other processed food products.

Developing countries include all low- and middle-income countries in Africa, Central-America, South-America and the Caribbean; East Asia, South Asia, Southeast Asia and Central Asia.

These non-traditional exports mainly concern products such as fruits, vegetables, flowers, fish, and seafood, which are consumed in fresh or processed form and for which the value (per weight or per unit) is typically much higher than for more bulky primary commodities destined for further processing, such as the typical tropical products. In Africa, the exports of fruits and vegetables has increased from 1.9 billion U.S. dollars in 1990 to 5.6 billion U.S. dollars in 2007 (FAOSTAT, 2010). Several African countries, including very poor countries such as Côte d'Ivoire, Ethiopia, and Senegal, have become important suppliers of fresh fruits and vegetables to EU markets. Similarly, several poor Latin American countries (Guatemala, Honduras, Bolivia) have successfully increased their exports of fresh vegetables to the United States.

The importance of this shift from traditional to non-traditional export commodities is twofold. First, many developing countries have for decades been highly dependent on one or just a few export commodities, which has made countries vulnerable, for example to volatilities and shocks in world market prices. The shift toward non-traditional exports implies more diversified export portfolios, which reduces these vulnerabilities. Second, non-traditional exports are high-value products for which the value per unit or per weight is much higher as compared to typical traditional tropical exports such as coffee, tea, and cocoa. This creates opportunities for rural income generation and poverty reduction among smallholder producers in these countries.

3 Organization and Structure of Value Chains

The shift toward high-value agriculture is accompanied by a thorough transformation of the agri-food sector. This restructuring or "modernization" of the supply chain includes: (1) the increasing number and stringency of standards – both public and private – for quality and safety; (2) a shift from a fragmented sector to consolidation in the chain (mostly at the level of processing, distribution, and/or retail); (3) a shift from spot markets transactions in traditional wholesale markets to increasing levels of vertical coordination, including value-chain finance. These structural changes have important implications for the participation of small farmers and distribution of the benefits.

3.1 Increasing Public and Private Standards

During the past decade, standards, including public regulations as well as private corporate standards, have increased sharply, especially for non-traditional export products such as fresh fruits, vegetables, and seafood, which are easily perishable. Fresh food exports to the European Union, for example, have to satisfy stringent public requirements, including marketing standards, labeling requirements, conditions concerning contamination in food, general hygiene rules, and traceability requirements. In addition, private standards, focusing on food quality and safety, or-

ganic production or fair trade, are increasingly established by large food companies, supermarkets chains, and NGOs, and play an increasingly important role in agro-food trade (Jaffee and Henson, 2005). The demand for higher food standards changed the way of doing business along the food chain.

Public and private food standards have often been claimed to act as barriers for developing countries' food exports, but it is remarkable that many poor countries experienced accelerated growth in fresh produce exports to high-income countries exactly during a period of sharply increased food quality and safety standards. For example, between 1997 and 2006 horticultural exports from Senegal increased five-fold, while the number of new sanitary and phytosanitary measures (filed to the World Trade Organization (WTO) increased six-fold over the same period.

3.2 Increasing Consolidation in Processing and Retail

Consolidation is taking place in the food industry, both in high income countries and in emerging economies. Most of this process is through mergers and acquisitions, and it applies both to food processing and retail companies. Large food companies are also spreading globally, through foreign direct investments. In this way they contribute to concentration outside of their home markets.

In many Eastern European transition countries, the five-firm concentration ratio in food retail is already high, above 60 percent in many countries. For example, the top five supermarkets in Bulgaria, Romania, and Poland represented respectively 59 percent, 61 percent, and 57 percent of supermarket sales in 2009. In most of South America, East Asia (outside China), and southern Africa, the average share of supermarkets in food retail went from only 10 to 20 percent in 1990 all the way to 50 to 60 percent by the early 2000s (Reardon et al., 2003). Also, food processing and exporting has become increasingly consolidated. For example, in Senegal the number of firms exporting green beans fell from 27 in 2002 to 14 in 2008 (Maertens et al., 2011).

3.3 Vertical Coordination and Value Chain Finance

The move toward value chains with increasingly stringent standards has led to changes in the organization of supply chains. Rather than being based on spot market transactions, value chains entail varying levels of vertical coordination at different nodes in the chains.[5] First, at the production level, contracting and verti-

[5] A 2005 comparative study by the World Bank on Eastern Europe and Central Asia came to the conclusion that such vertical coordination programs were important in transition countries for several commodities, and growing (World Bank, 2005; Swinnen, 2006). The study concluded that, for example, in the dairy sector, extensive production contracts have developed between dairy processors and farms, including the provision of credit, investment loans, animal feed, extension services, bank loan guarantees, etc. In the sugar sector, marketing agreements are widespread, but also more extensive contracts, including also

cal coordination has grown strongly in some of the high-value supply chains in Latin America, Asia, Europe, and Africa (Swinnen, 2007; World Bank, 2005). Part of these vertical coordination initiatives include the provision of, for example, finance, transportation, physical inputs, and quality control. However, investment loans and bank loan guarantees are also provided in several cases.

Rising food standards are increasingly associated with a shift toward even more extreme levels of vertical coordination in upstream processing and trading. Large exporters increasingly engage in fully vertically integrated estate production where wage laborers are hired to work on large-scale plantations.

Second, downstream vertical coordination is also increasing, which is apparent in vertical relationships between global retailing and food import companies and overseas suppliers. Most African fruit and vegetable exporters, for example, have ex-ante agreements with European importers before the start of the season. Some of these agreements are oral and do not include binding specifications in terms of prices or delivery dates. Yet, most large exporters increasingly engage in more binding contracts with buyers, including a (minimum) price, quantity, and timing of delivery. Some exporting firms even receive pre-financing from their overseas partners.

4 Small Farmer Participation in Value Chains

The claims mentioned earlier in this chapter about the exclusion of small farms from value chains were based on limited empirical evidence. New empirical evidence from a variety of countries shows a largely consistent and much more nuanced picture. The studies generally confirm the main hypotheses that transaction costs and investment constraints are a serious consideration in these chains, and that processing and retailing companies express a preference for working with relatively fewer, larger, and modern suppliers. However, empirical observations

input provisions, investment loan assistance, etc. In both the dairy and sugar sectors, the extent of supplier assistance by processors also goes considerably beyond some of the trade credit and input assistance provided by agribusiness to farms in some developing countries. In cotton, cotton gins typically contract farms to supply seed cotton and provides them with a variety of inputs. This model, which is common in Central Asia, resembles that of the gin supply chain structure in developing countries, such as in Africa. However, the extent of contracting and supplier assistance seems to be more extensive in Central Asia, with credit, seeds, irrigation, fertilizer, etc., being provided by the gins. In fresh fruits and vegetables, the rapid growth of modern retail chains with high demands on quality and timeliness of delivery is changing the supply chains. New supplier contracting, which is developing rapidly as part of these retail investments, include farm assistance programs, which are more extensive than typically observed in Western markets. They resemble those in emerging economies, but appear more complex in several cases. Finally, in grains there is extensive and full vertical integration in Russia and Kazakhstan, where large agro-holdings and grain trading companies own several large grain farms in some of the best grain producing regions.

Table 1. Smallholder procurement in Sub-Saharan African export supply chains

Country	Commodity (group)	Year of survey	Share of exports sourced from smallholders	Number of smallholder producers
Ghana	Fruits & vegetables			3,600
	Pineapples	2006	45%	300–400
	Papaya	2006	10–15%	
	Vegetables	2002	95%	
Cote d'Ivoire	Pineapples	1997	70%	
	Mango	2002	<30%	
	Banana	2002	100%	
Senegal	French beans	2005	52%	600–900
	Tomatoes	2006	0%	0
Kenya	Fresh fruit & vegetables	2002	±50%	12,000–80,000
Madagascar	Fresh vegetables	2004	90-100%	9,000
Zambia	Vegetables	2003		300
Zimbabwe	Fruits & vegetables	1998	6%	10

Source: Maertens et al. (2009)

also show a very mixed picture of actual participation in value chains, with many more small farms being contracted than claimed initially. Table 1 summarizes this for a selection of countries.

Hence, the recent literature shows that small farmers are indeed "excluded" in some value chains and in some countries, but that this is far from a general pattern, and that small and poor farms are included in value chains to a much greater extent than expected ex-ante based on arguments of transaction costs and capacity constraints.

Some studies show there is variation in the nature of contracts and value chain finance going to different farm structures. For example, in case studies of dairy processors, investment support for larger farms include leasing arrangements for on-farm equipment, while assistance programs for smaller dairy farms include investments in collection units with micro-refrigeration units (World Bank, 2005).

Some studies find that within the "small farm" group it is the (relatively) richest and most educated that are included and that the poorest are being excluded (Maertens and Swinnen, 2009). However, even this is not an undisputed general conclusion. Other studies show that the poorest may be included, and some countries (e.g. China) even show that the "horticultural revolution" (associated with

simultaneous dramatic growth of modern retail investments and urban demand for horticultural products) is associated with a pro-poor bias in the supply chain (Wang et al., 2009).

4.1 Small Farmer Inclusion and Governance

An important aspect of the growth of modern value chains is the governance and industrial organization of these supply chains. In particular, as mentioned earlier, there is much evidence that vertical coordination is widespread in high value chains, often as an institutional response to overcome problems of local market imperfections. With investors and food companies facing important problems of sourcing high quality produce on the supply side and high consumer standards on the demand side, vertically coordinated systems have emerged to control standards by suppliers and to provide suppliers with inputs and management advise. Vertical coordination varies from integrated (large) farms managed by food companies to extensive contracting arrangements with smallholders.

The rise of contracting, far from leading to the exclusion of poorer farmers, is shown to improve access to credit, technology, and quality inputs for poor, small farmers that heretofore were faced with binding liquidity and information constraints due to poorly developed input markets. Studies have found extensive evidence of input provision through interlinked contracts – in the form of inputs, credit, bank loan assistance, technology, and management advice, etc. Minten et al. (2009) and Maertens and Swinnen (2009) find that due to increased vertical coordination in newly emerging value chains between buyers and poor, small farmers in African countries, such as Madagascar and Senegal, poor rural households experienced measurable gains from supplying high-standard horticulture commodities to global retail chains.

However, this is not always the case. For example in China, Wang et al. (2009) found that while rising urban incomes and emergence of a relatively wealthy middle class were associated with an enormous rise in the demand for fruits and vegetables, almost all of the increased supply was being produced by small, relatively poor farmers that sell to small, relatively poor traders. Despite sharp shifts in the downstream segment of the food chain toward modern retailing (there has been a rapid increase in the share of food purchased by urban consumers in supermarkets, convenience stores, and restaurants), marketing and production are still organized by traditional methods.

In general, a wide variety of models of value chain development have emerged, with variations both across countries and across sectors, reflecting different commodity and market characteristics, resource constraints, etc. For example, in parts of Africa where access to land is ample and easy, large-scale farms have been set up in some cases. In other cases, where land is already used by smallholders and land pressure is strong, contracting systems have been set up. Comparative advantage of small versus large farming systems, associated with different types of

commodities – such as extensive grain growing versus intensive, high-quality vegetable production systems – have also led to different chain models. We will document and explain these changes and the models that have emerged in the final section of this chapter.

5 Value Chain Finance[6]

The provision of credit within state-controlled supply chains was widespread in the 1960s and 1970s. This was most extreme in the Communist system where production at various stages and the exchange of outputs and inputs, including credit and finance, along the chain was coordinated and determined by the central command system (Rozelle and Swinnen, 2004). Also in other regions, government marketing organizations and parastatal processing companies often provided credit to their suppliers. The dominant form of state-controlled VCF was that of seasonal credit provisions to small farmers in return for supplies of primary produce (Poulton et al., 1998). In fact, state-controlled VCF was often the only source of credit (and other inputs) for peasant farmers (IFAD, 2003).

This system of state-controlled supply chains and VCF has undergone tremendous changes during a period of reform in the 1980s and 1990s. In the transition world, the liberalization of exchange and prices, and the privatization of farms and enterprises caused major disruptions in the chain and in credit supply for farms (Swinnen and Gow, 1999). During the period of transition, many farms faced serious constraints in accessing finance. Also in many developing countries privatization and market liberalization led to a sharp decline in the supply of credit and inputs to farms as it disrupted the working of various government-controlled agricultural institutions, cooperative unions, and parastatal processing companies (IFAD, 2003). As government marketing boards and cooperatives have ceased to play a major role in the procurement of agricultural produce, so has the provision of credit through state-controlled VCF. In addition, market liberalization led to a decline in government (subsidized) credit to the agricultural sector.

Following privatization and liberalization, new forms of VCF have emerged and are growing (Swinnen, 2007; World Bank, 2005). These are no longer state-controlled but are introduced by private companies. Private traders, retailers, agribusinesses, and food processing companies increasingly contract with farms and rural households to whom they provide credit and financial services in return for guaranteed and quality supplies.

Farmers face financial constraints and constraints in accessing inputs because of imperfections in rural credit and input markets. Private contract-farming

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[6] See Miller and Jones (2010), van Empel (2010), Winn et al. (2009) for excellent recent reports on the importance of value-chain finance and reviews of different cases, models, and applications; and Kloeppinger-Todd, R. and M. Sharma (2010) for a review of innovations in rural and agricultural finance.

schemes are primarily set up by processors, traders, retailers, and input suppliers as a private institutional response to these constraints.

Table 2, based on surveys, shows that for small cotton farmers in Kazakhstan access to credit is by far the most important reason to enter into contracts with cotton gins. Similarly, for small vegetable farmers in Madagascar and Senegal, access to credit in the form of cash credit, as well as in the form of pre-financed inputs, is a very important motivation to sign contracts with exporters.

Table 2. Motivations of small farmers to supply high-value chains

a. Cotton farms in Kazachstan

	Reasons for contracting (%)	**Most important reason (%)**
Guaranteed product sales	9	8
Guaranteed price	4	3
Access to credit	81	75
Access to quality inputs	11	10
Access to technical assistance	0	0
Other	4	3

b. Vegetable farms in Sub-Saharan Africa

	Madagascar 2004	**Senegal 2005**	
	Reason for contracting (%)	Reason for contracting (%)	Most important reason (%)
Stable income	66	30	
Stable prices	19	45	15
Higher income	17	15	
Higher prices		11	10
Guaranteed sales		66	32
Access to inputs & credit	60	63	44
Access to new technologies	55	17	0
Income during the lean period	72	37	

Source: Minten et al., 2009; Maertens et al., 2007; Swinnen, 2005

For VCF to function, the downstream company offering finance itself needs sufficient funds and cash flow to finance an VCF system. Initiators of VCF programs often include foreign investors (who have access to more financial means because they have "deep pockets" or because they can access financial markets internationally), or companies who have financial resources from activities in other sectors (and who are interested in investing these funds in the food sector, such as financial-industrial groups in Russia), or domestic processors and traders who sell on the international market (and have thus sufficient financial liquidity, such as grain traders in Kazakhstan); or domestic processors who have links with the international finance through VCF themselves (such as cotton gins in Central Asia who receive pre-financing through contracts with international cotton traders) (World Bank, 2005).

6 Models of Private Sector VCF

Different models of private-sector VCF exist. Sometimes different models of VCF develop because processors themselves do not have access to finance. For example, in the Ukrainian oilseed sector in the 1990s, farms preferred to sell oilseeds to trading firms through barter contracts against inputs, such as agricultural machinery and fuel oil, rather than to crushers. Because processors (crushers) had poor access to credit, traders, equipment suppliers, and even banks procured seeds for the oilseed crushing factories. Many farms also retained ownership of their product, leaving the crushing plants in their role of subcontractors, who charged a tolling fee for processing seeds. In 1999, around 80 percent of the crushers throughput of sunflower seeds was based on a tolling basis. Under the tolling system, crushers received 13 to 20 percent of the oilseeds delivered to them as their toll payment for crushing. The oil obtained from the rest was returned to the owners (equipment suppliers, farmers, traders), who sold the oil either in the domestic market (competing with the crushers) or exported it (EBRD/FAO, 2002).

Alternatively, if domestic sources of finance are lacking, with tradable commodities foreign traders may provide the necessary finance for the whole chain. For example, in the Kazak cotton chain forward contracting between domestic processors (cotton gins) and international cotton traders provided the gins with financial means to pre-finance the farms' inputs (Sadler, 2005).[7] Hence the gins received themselves VCF from the international traders that they then used to finance their own VCF schemes with cotton farms. However, more generally, one can distinguish several "classes" of VCF.

[7] The resulting ownership structure is the opposite to that in the United States or Australia, as the Central Asian farms, mostly small farms that have limited access to finance, sell the cotton to gins while in the United States and Australia farms maintain ownership of the cotton throughout the chain, and gins are paid as service providers.

6.1 Trade Credit

In its most simple form, VCF comes down to credit supplied by traders and middlemen. Trade credit usually involves short-term seasonal loans, in cash or in-kind, generally between agricultural producers and produce buyers (or input suppliers). These type of trade-credit relations often do not involve a purchasing agreement and the farmer is free to sell his produce to other buyers as long as he can pay off his debt. However, crops are used as collateral and in case of default the trader/middlemen cashes in on the standing or harvested crops as loan repayment. The provision of credit through middlemen and small traders is mostly informal, and often based on social and personalized trade relations.

6.2 Interlinked Contract-Farming

The dominant type of VCF is that of contract-farming, in which the provision of credit is linked to a purchasing agreement for agricultural produce. This was also the dominant type of state-controlled VCF: seasonal credit and input provisions to farmers by (para)-state processing units and government marketing boards in return for supplies of primary produce.

Also, private-sector VCF mostly includes the provision of cash credit or agricultural inputs directly to farmers for which payment is accounted for at the time of delivery of the product. These basic forms of VCF have been studied in the development literature on interlinked market transactions[8] and have been described as transactions in which credit and output markets are interlinked (e.g. Bardhan, 1989; Bell and Srinivasan, 1989). They are also the essence of various outgrower schemes, which are widely documented (see e.g. Table 1).

However, much more complex forms of contract-farming and VCF are emerging. Apart from transactions in credit and output markets, contract-farming increasingly also includes the provision of extension services, technical and managerial assistance, quality control, transport, and specialized storage services to farmers. Moreover, several food companies, such as in Eastern Europe and the former Soviet Union, provide medium-term investment loans, investment assistance programs, and machinery procurement systems to farmers (Dries et al., 2009).

[8] Bell and Srinivasan (1989) define interlinked market transactions as a transaction in which the parties trade in at least two markets on the conditions that the terms of all trade between them are jointly determined. Interlinked market transactions always include an element of credit as they involve exchange of current for future claims. Apart from interlinked credit and output transactions, interlinked transactions also exists in land markets (landlord who provide tenants working capital) and in labor market (employers who give advances to laborers in return for a claim on their labor in peak labor demand periods).

6.3 Loan Guarantee Programs

Triangular structures were used by processors and retailers in Eastern Europe to draw on in financial institutions, resources, and administrative capacities. Examples of this are processor or retailers who provide loan guarantees to financial institutions for loans to their suppliers (farmers). The underwriting is for specific loans, related to the contract, and restricted for contracting suppliers. Loan guarantee programs within triangular contracting structures were implemented, for example, by sugar processors in Slovakia (Gow et al., 2000), by retailers in Croatia for fruit and vegetable supplier investments in greenhouses and irrigation (Reardon et al., 2003), and by dairy processors in several countries (Dries and Swinnen, 2004).

6.4 Special Purpose Vehicles

An even more complex form of indirect VCF, where both input suppliers and processors are included, is the use of so-called "special purpose vehicles (SPVs)". A SPV is a stand-alone company jointly owned, for example, by the processor, input providers, and a bank. The contract between the SPV and the farms can include provisions on output, inputs, and credit.

An important advantage of such institutions is that the partners in the SPV now share the risk of contract breach. When a processing company by itself implements input and investment facilitation programs, the processor carries the entire risk of farms' breaching contracts, although both the input suppliers and the financial institutions benefit from these contract innovations. Institutions such as SPVs allow the sharing of risk between various agents, and hence will stimulate investments by companies who otherwise may be deterred by the risk.[9]

Another example of a triangular structure with a specially designed institution is the collaboration between the Russian dairy processor Wimm Bill Dann (WBD) and the Swedish dairy equipment seller DeLaval to sell milking equipment to Russian dairy farms through leasing contracts. The program allowed financially constrained dairy farms to lease milking equipment. The farms paid off by delivering the raw milk to one of the dairy processors owned by WBD (World Bank, 2005).[10]

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[9] In some cases such structures have developed with farmer participation. For example, Gow and Swinnen (2001) report that in eastern Hungary a group of sheep farmers set up a producers' co-operative through which they participated in a SPV-like joint company.

[10] One example of this was implemented by an international financial institution specialized in agribusiness and food supply chain financing in Hungary, in collaboration with local agribusiness partners (Gow and Swinnen, 2001). See also van Empel (2010).

6.5 Warehouse Receipt Finance [11]

Warehouse receipt payments is another form of indirect VCF in which safe and secure warehouses issue warehouse receipts to depositors of commodities and allow financial institutions to use the deposited inventory as safe, dependable, and liquid collateral. This is an indirect form of VCF in which producers can use deposits at a warehouse as collateral for a loan.[12] Such a system is most common for grains and other non-perishable products.[13]

7 Importance of VCF

White and Gorton (2004), Dries et al. (2009), and Swinnen (2006) find that the introduction of VCF programs by agribusiness companies is a common phenomenon across transition countries.

Also in Latin America, VCF through credit and input provision in contract-farming schemes is widespread over many different agricultural sectors such as fruits and vegetables sector, poultry, tobacco, sugarcane, barley, and rice (Dirven, 1996). Similarly, at least in some value chains in India, VCF is quite common. Gulati et al. (2007) point out, with evidence from several South and Southeast Asian countries and from several sectors that smallholder and poor farmers participate in and benefit from contract-farming schemes and VCF systems in food supply chains in Asia. In Sub-Saharan Africa (SSA), private VCF has become a dominant system of rural financing. For example, in Mozambique and Zambia it is virtually the only source of finance for agricultural households (IFAD, 2003). It is estimated that for SSA as a whole, 50 percent of rural households that access credit do so from wholesalers, retailers, and processors in the form of VCF. (DFID, 2004). According to IFAD (2003), the VCF in Sub-Sahara Africa is mostly direct VCF in the form of seasonal credit and input provision in contract-farming schemes; and is most common in traditional, tropical export sectors (coffee, tea, cocoa, rubber, oil palm) and in high-value, non-traditional export sectors (horticulture)[14].

In summary, in many countries and sectors VCF is becoming more important than pure credit transactions in traditional commercial and informal lending.

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[11] See Höllinger et al. (2009) for a review of warehouse receipt finance in transition countries.

[12] Warehouse receipts systems have also been set up, for example in the Kenyan maize market in 2007 but remain very limited there (Collins, 2009).

[13] Warehouse receipt systems have proven to be a successful instrument in providing finance in the value chains for source countries, in particular for storable commodities such as grains, in transition countries (World Bank, 2005).

[14] For example, in Mozambique 270,000 and 100,000 smallholders respectively receive input credit from cotton and tobacco companies in contract-farming systems (IFAD, 2003).

Maertens et al. (2007) have analyzed the importance of VCF for smallholder horticulture households in Senegal and find that farmers who contract with exporting companies receive on average about 300,000 FCFA seasonal credit from the companies, mostly in the form of inputs, while on average farm-households can access only about 130,000 FCFA of credit a year from other formal and informal sources.

8 Impact of VCF on Productivity, Quality and Output

Empirically, the impact of private VCF systems on productivity is difficult to quantify as several other factors affect output simultaneously and as company-level information is difficult to obtain. Still, whatever evidence is available suggests that successful private VCF has important positive effects, both direct and indirect.

Case studies indicate that private VCF programs can lead to strong growth in output, quality, and productivity. For example, case studies of the sugar and dairy sectors in Eastern Europe show how VCF caused output, yields, and investments to grow dramatically (Gow et al., 2000; Swinnen, 2006). In the case of Polish dairy farms, VCF induced an increase in farm investments (in particular cooling tanks and better cows) in the mid-1990s. As a result the market share of the highest quality milk increased from less than 30 percent on average in 1996 to around 80 percent on average in 2001 (Dries and Swinnen, 2004).

VCF has indirect spill-over effects as households' overall access to capital increases and their risk reduces. VCF also implies guaranteed sales, often at guaranteed prices, which reduces marketing risk for farmers. Coordinating firms also share in the production risk of farmers through ex-ante provision of inputs and credit. Moreover, credit arrangements and prompt cash payments after harvest in VCF programs improves farmer's cash flow and access to capital, with spillover effects on other household activities, including other crops. Reduced risks, improved income stability, and access to capital are particularly important effects in the case of capital and insurance market imperfections.

A number of empirical studies provide evidence for these household spillover effects. Henson (2004) shows that contracted vegetable farmers in Uganda benefit from reduced risk and improved access to credit. Another illustrative example comes from Minten et al. (2009) on the vegetable sector in Madagascar. A large number of very small farms benefit from vegetable contract farming through more stable incomes, shorter periods without revenue, and technology and productivity spillovers on rice. Studies examining the motivations of farmers to engage in contract-production with VCF show that access to inputs, credit, and guaranteed sales prices, are the most important motivations, not direct income effects (see table 2).

If the processing firm can set the terms of the VCF contract such that it captures the rents, the productivity growth may not benefit the farms (Bardhan, 1989); and interlinking may even bestow additional monopoly power upon the processing company, which may exploit unequal power relationships with farmers to extract

rents from the chain. While empirical evidence on this issue is limited, and very few studies have actually tried to measure this, what is available suggests that farmers do share importantly in the benefits of VCF. For example, studies on the horticultural export sector in Africa (Madagascar by Minten et al. (2009), and in Senegal by Maertens and Swinnen (2009), and Maertens et al. (2011)) find that there are strong poverty reduction effects from vertical coordination and VCF in high-value supply chains.

9 Policy Issues

There are a variety of policy issues related to VCF and development. They can be classified in several groups: the enabling environment for the emergence of VCF; addressing rent distributional and efficiency concerns of VCF; and implications of VCF for public interventions in agriculture and agri-business development.

First, it is important to emphasize a general policy implication, which is to recognize the potential importance of VCF and, therefore, the need to explicitly integrate this into policy thinking and program strategies. One of the key findings of this review is that VCF is more widespread than generally recognized, albeit with significant variation across countries and sectors. Hence there is no one-size-fits-all VCF but instead several models of VCF, reflecting commodity characteristics, and stages of transition and development. There is no one-size-fits-all policy. Instead optimal policies and policy components will also need to differ and change to reflect these differences.

Second, policy implications are necessary for a good investment climate and the reduction of policy uncertainty, which is the primary concern of firms in developing countries. A poor policy environment has a negative effect on investments in the supply chain and on the beneficial effects of VCF programs.

Third, macro-economic stability is a key condition not only for the investments but, even more so, for various forms of chain-based finance. Since VCF is a financial activity, significant instability may cause such changes in the contract conditions that self-enforcement is no longer possible. Hence, macro-economic stability is not only necessary for more traditional finance systems but also for VCF.

Fourth, an important issue is the role of competition, both for efficiency and equity. Competition induces processors, retailers, and input suppliers to provide VCF and it constrains rent extraction of suppliers by up- or downstream companies (Swinnen and Vandeplas, 2010). Given these strong benefits of competition for farms in the chain, ensuring competition is an important role for the government. Competition can be enforced through both domestic policies (competition policies, lower barriers of entry) as well as external policies (liberal trade policies). The importance of competition does not only apply to private companies, but holds also for the case when the government is directly or indirectly imposing a monopoly system and thereby extracting rents from farms. However, it should

also be pointed out that some have argued that too much competition may be detrimental to VCF as it can undermine enforcement (Poulton et al., 1998).

Fifth, related to the competition issue, it remains important to encourage alternatives in credit markets. Empowering farmers in VCF relations with companies will come importantly from alternative options in accessing credit. The existence of alternative channels of credit or inputs will constrain rent extraction in the supply chains – and is good in general. Therefore, the existence of VCF does not necessarily diminish the importance of investments in alternative sources of farm finance, like bank credit to farmers, or leasing

Sixth, another area where governments can play an important role is investments in institutions to assist farms with credit contract negotiations and dispute settlements. As it is generally either not possible or too costly to resolve disputes in courts, alternative dispute settlement institutions can play an important role. Measures to increase the transparency of VCF contracts, to support alternative dispute settling arrangements, provide market benchmarks for price negotiations, training farmers in their rights/obligations as contractors, etc., are all important to increase the transparency of the VCF system, competition among systems, and thereby the bargaining position of farms.

Finally, governments (and development agencies) should look into supporting innovative finance instruments. A key conclusion is that the most successful VCF approaches have addressed specific constraints, are flexible, and allow adjustments to reflect changes in the environment. Some innovative instruments using chain-based financing are mostly private initiatives and there is only a limited role for the government. In other cases there may be a more important role, for example the regulatory and legal system, which is required for these instruments to function; or there may be a role in co-financing seed money to start up some of these innovations. The key conclusion is being open to innovations that explicitly take into account the value chain as a structural aspect of the financing problem.

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CHAPTER 4

Agricultural Growth Corridors – Unlocking Rural Potential, Catalyzing Economic Development

Sean de Cleene[1]

African agriculture has, on the whole, been characterized by low yield levels. Yet, as a continent it has significantly untapped potential in terms of productivity and agricultural growth. Infrastructure constraints, the high risk in complex value chains, and a traditional lack of government prioritization of agriculture, have historically provided limited incentive for investment. Agriculture represents 65 percent of African full-time employment, and an estimated 85 percent of the population is directly dependent on the sector for its livelihood. Increased productivity has the potential to improve the livelihoods of the rural poor and to enhance food security.

By entering into transformative public-private partnerships, Yara International ASA has played a catalytic role in developing the agricultural growth corridor concept, the rationale of which is to leverage investment and demonstrate a sustainable growth mode. With good soil and climate conditions, backbone infrastructure, and targeted catalytic financing there is great potential to cascade investments along the agricultural value chain.

The combined effect, should both the Beira Agricultural Growth Corridor in Mozambique (BACG) and the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) be realized to their full potential, is the lifting of more than three million rural poor out of poverty. Through the leveraging of potential investments of about $5.4 billion, annual agricultural revenues could increase accordingly by $2.2 billion.

Despite decades of neglect, African agriculture has the potential to reclaim its former position as the main mover of economic growth on the continent. Africa has failed to cope with population growth since the early 1960s; in many cases productivity rates were stagnant or even in decline. Agricultural GDP growth toward the end of the first decade of the new millennium rose to about four percent. This demonstrates that potential exists for much more substantial growth if the various sectors come together to accelerate productivity rates in a sustainable way and in line with increasingly transparent and improved market dynamics.

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"The underdeveloped agricultural sector presents one of the most serious structural limitations to growth," the Africa Progress Panel claims, pointing to "severe under-investment" having left crop yields virtually stagnant at a mere quarter of the global average.[2]

Africa has in recent years taken great strides to move agriculture back to the top of its political and developmental agenda. One notable, high-level policy initiative is the 2003 Comprehensive Africa Agricultural Development Program (CAADP) document; it outlines Africa's agriculture strategy, which includes a calling upon the private sector to help accelerate growth in the sector.

1 Global Challenges

Food security for a future world population of more than nine billion people is one of the main global challenges of our time. It will require food production to increase 70 percent by 2050. The challenge appears even more daunting against the backdrop of climate change and resource scarcity. This production increase has to be achieved on virtually the same amount of farmland – and in many cases without additional fresh water resources – while also aiming to reduce overall carbon emissions per ton of crop.

Global growth also affects agriculture: The world population will grow to an estimated 9.1 billion by 2050, meaning more mouths to feed. Africa alone is set to double its population, to about two billion in the next forty years. Global economic growth results in a bigger middle class and higher purchasing power, driving the consumption of agricultural produce, including dietary changes. At the same time, the McKinsey Global Institute argues that this growth will create more consumer markets that are large enough to be attractive to multinational companies, drawing investments and technology transfers. "Africa's agriculture holds enormous potential for companies across the value chain," the McKinsey study states.[3]

Climate change, bringing with it more erratic weather conditions, is expected to have a detrimental effect on agriculture in large regions, not least in food-insecure parts of the tropics. In particular, South Asia and Sub-Saharan Africa may face severe challenges, pinpointing the need to strengthen agricultural productivity and create more climate-robust agricultural systems on the continent. Whereas agriculture's quest for more land drives up carbon emissions, increased productivity may help to mitigate emissions by reducing pressure on existing forests. By facilitating a growth strategy in the two agricultural growth corridors, productivity by the acre is set to increase significantly. In addition, in the case of Tanzania, work is already

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2 Africa Progress Panel, "Doing Good Business in Africa: How Business Can Support Development", 2010.

3 Ibid.

underway to develop a Green Growth Agricultural Growth Corridor overlay strategy to ensure that a balanced and long-term sustainable approach to investment and growth can be established, while in Mozambique such a sustainability type approach is implicit within the catalytic funding models being adopted.

2 African Agriculture

Agriculture constitutes the core of the African economy. The sector accounts for about 65 percent of full-time employment and an estimated 85 percent of Africans depend upon the sector, which contributes nearly a third of GDP, and over half of total export earnings to the continent's economies.

2.1 African Challenges

African agriculture faces a number of simultaneous challenges. Not only is the need for investments in physical infrastructure immense, there is an alarming backlog in investments in human resources, including innovation, R&D, training, education, and extension service delivery.

The most critical challenge is low productivity. Whereas per capita food production since 1960 has doubled in Asia, it has remained largely stagnant in Africa south of the Sahara. In contrast, population growth rates have been – and look set to remain – high.

Decades of negligence and underinvestment have also resulted in reduced soil quality. With the lowest mineral fertilizer application rate of any region, at about seven to eight kilograms per hectare (against a middle and low-income country average of about a 1–200), and together with a shortage of organic fertilizers, African soils have been constantly mined for minerals without adequate replacement. Large areas of land have become unproductive, and need to be replenished with nutrients in a managed and sustainable way. In light of global warming, the dry areas of Africa will become even dryer, adding another challenge: lack of fresh water and low rates of irrigation. Altogether this has contributed toward low yields, weak markets – and resulting low profitability across the sector as a whole.[4]

Another challenge is the fact that today African producers are generally not particularly competitive in global markets, though this is slowly changing. At the same time, they are generally competitive in domestic markets – and supplying domestic and, even more so, regional markets harbors a great potential in the short to medium term. "We don't even have to think about markets outside of the conti-

[4] The IPCC anticipates that dry areas, including large parts of Africa, which already suffer from fresh water shortages, will receive less rainfall.

nent," Peter Hartmann, Director General of the International Institute for Tropical Agriculture, told the 2007 African Green Revolution Conference.[5]

Traditionally, business has not invested in African agriculture because of a lack of confidence in the sector as a whole, seeing the complexity of existing agricultural value chains as being too risky. In addition, inadequate infrastructure and unclear regulations often represent formidable challenges, with regional markets being fragmented and as a result lacking in scale.

While stagnating yields and decreasing support government support to agriculture were the story of the last few decades of the 20th century, in the last few years we have seen a complete turnaround regarding the willingness of both local governments and the international community – as well as the private sector – to invest in agricultural development in Africa. Recently, a raft of private sector agriculture funds have been launched, which could potentially boost private sector investment in the sector. However this will only occur if a sufficient pipeline of new and sustainable investments is developed.

A critical ingredient in converting both public and private sector commitment into actual on-the-ground sustainable investments is the need for governments and businesses to work together to overcome some of the main challenges to successful agricultural growth. A key focus therefore needs to be the forging of partnerships between the public and private sectors to ensure African agriculture can be more profitable for smallholder, medium, and large farmers alike.

Agricultural growth corridors demonstrate the potential for such public-private partnerships and for investments to achieve transformative change. Not only are they public-private partnerships in a traditional sense, they are also a multi-sector commitment to action. Farmers need access not only to land seeds and fertilizers but also to transport, power, and water. Ports must be efficient to be able to import inputs, and roads must be built to reach the farmers. Smallholder farmers and agro-dealers need access to rural financing through innovative financing instruments that support agricultural development at different stages. "Ensuring agriculture is financed appropriately in Africa will require a long term view. New models of longer term patient capital are required such as those proposed by AgDevCo. Such models seek to provide risk capital to partially fund development of last mile infrastructure, irrigation and land preparation, at concessionary rates however with a corresponding transformation requirement that often involves integration of small holder farmers as a prerequisite for financial support. More such models are critically needed if we are to see agriculture development go to scale."

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[5] The African Green Revolution conferences were initiated by and co-hosted by Yara in Oslo in 2006–2008. Summaries from presentations and proceedings can be found at: www.agrforum.com/about.

2.2 Political Support

The political support rendered agriculture in Brazil, China, Vietnam, Thailand and other countries now hailed as initial success stories, has largely been lacking in Africa until very recently. After decades of relative negligence by national governments, bilateral donors, and multilateral organizations as well as national governments alike, agriculture in the last decade has begun to climb back to the top of political, economic, and development agendas in Africa.

The establishment of the New Partnership for Africa's Development (NEPAD) was a political watershed in Africa.[6] In 2003, NEPAD together with the African Union (AU) issued the key strategy platform for the development of African agriculture, the Comprehensive Africa Agriculture Development Program (CAADP). This is a strong manifestation of African governments' commitment to address issues of growth within the sector, promoting rural development and food security. In 2005, African heads of state adopted the Maputo Declaration,[7] whereby African governments provided strong political support to CAADP. Member countries of the AU are committed, inter alia, to allocate at least ten percent of national budgetary resources to agriculture and rural development, with the aim to secure an annualized sectoral growth rate of six percent. Pillar two of the CAADP calls for the private sector to help accelerate growth in the agricultural sector, i.a. through fostering partnerships to promote infrastructure development related to agriculture.[8]

In addition to this, leadership and country ownership of the agricultural growth corridor approach, has been a determining factor, particularly in Tanzania where President Kikwete's active and personal engagement together with a range of in country champions has been instrumental in the early stage success of the approach.

2.3 African Green Revolution

In 2004 in Addis Ababa, the then Secretary General of the United Nations, Kofi Annan, challenged the world to create a genuine African Green Revolution.[9] Participating in the Addis seminar, Yara[10] decided to head the response to Annan's

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6 The NEPAD was created as a framework for political and economic cooperation by the Organization of African Unity and the G8 countries in 2001.

7 Formally, the Declaration on Agriculture and Food Security in Africa.

8 The CAADP contains five pillars, areas of priority: expansion of land; improvement of rural infrastructures; the enhancement of food supplies; the development of agricultural research; the sustainable development of livestock.

9 Africa's Green Revolution: A Call to Action was a high-level seminar convened by Ethiopia and the UN Millennium Project in Addis Ababa, July 2004.

10 Yara International ASA is a leading global chemical company that supplies mineral fertilizers and converts energy and nitrogen from the air into essential products for industrial customers.

challenge to the private sector. In conjunction with its centenary celebration in 2005, Yara launched its Africa program, subsequently hosting the Oslo series of African Green Revolution Conferences, initiating local partnerships, and launching the concept of agricultural growth corridors. This concept has now developed into two concrete corridors, one in Mozambique and one in Tanzania.[11]

For Yara, its support of the African Green Revolution is firmly in line with its permanent presence on the African continent since 1985, and is consistent with its core business, namely providing knowledge-based solutions and improving agricultural productivity. The Africa program is in congruence with Yara's global corporate citizen approach, facilitating a platform of shared value creation.

With the Oslo conferences, Yara established a focus on and venue for private-public partnerships in support of the African Green Revolution, bringing together key stakeholders from the public and private sector as well as representatives from civil society, notably academia and NGOs.

2.4 African Potential

The vast potential of African agriculture is undisputed. As one of the continent's underutilized assets, it harbors the potential not only to feed the continent's population, but also to become its engine of economic growth and social development. Still, as the late Nobel laureate and supporter of the African Green Revolution Norman E. Borlaug used to say: "You can't eat potential." It has to be tapped.

Land is a key issue. Theoretically, there is plenty of land available worldwide. But realistically, options are limited. In Africa, the potential expansion is more promising, in particular south of the Sahara and the Sahel, in the Guinea Savannah Zone, an area stretching across the continent from Guinea in the West toward Ethiopia in the East, and southward through Uganda to another belt across from Angola to Mozambique and Tanzania.[12] This is an area of about 600 million hectares, of which about 400 million is considered suitable for agriculture – and less than ten percent of it is cropped today. According to the Competitive Commercial Agriculture for Africa (CCAA) study, this is "one of the largest underused agricultural land reserves in the world."[13]

The area is often likened to the Cerrado region of Brazil or the northeast region of Thailand, both of which are hailed as success stories of modern agriculture. Both regions started their agricultural transformation with limited perceived po-

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[11] By 2010–11, Yara had initiated or joined three such partnerships; the Ghana Grains Partnership, the Malawi Agricultural Partnership, and the Tanzania Agricultural Partnership.

[12] This vast area is defined and described in the "Awakening Africa's Sleeping Giant" (2009) report, which looks into the prospects for commercial agriculture in this and adjoining areas.

[13] Ibid., p. 2.

tential and poor infrastructure. Yet, with dedicated political support, technology application, and financial investments, both regions have become productive and highly competitive in world markets. They started with low-value commodities, and moved into higher-value products. Interestingly, in view of Africa's physical and social conditions that involve significant numbers of smallholder farmers, whereas Brazil achieved its market successes by relying on large-scale mechanized methods, smallholders dominate the sector in Thailand and it will be in finding a sustainable balanced solution to commercial agriculture in Africa, that successfully integrates smallholder farmers, that Africa will transition to a major food producing region.

In his book *The Plundered Planet*,[14] the influential development economist and Director of the Center for the Study of African Economies at Oxford University, Professor Paul Collier, points to Brazil as a model of how food can be mass-produced at scale. Drawing on these experiences, he argues that this model of large, high-productivity farms could "readily be followed in areas where land is underused," citing Zambia as an example. This opinion is shared by the distinguished soil expert and Director of the Tropical Agriculture and the Rural Environment Program at the Earth Institute, Columbia University, Dr. Pedro A. Sánchez, who points to a belt across southern Africa, including Zambia as well as Mozambique and Tanzania, encompassing the area of the two agricultural growth corridors.[15] He calls it Africa's own Cerrado.[16]

For Africa to realize its agricultural potential, lessons can be drawn both from Brazil and Thailand. This includes the improvement of agricultural technologies, and government investments in rail and roads, as well as research and development. There must also be public support to develop a dynamic private sector, including commercialization of smallholder farmers at scale. Country case studies carried out by the CCAA study suggest that the prospects for commercial agriculture success, including involvement of smallholder farmers, in countries such as Mozambique, Nigeria, and Zambia, are as good as or even better than in Brazil and Thailand at the time of their agricultural revolutions.

At the same time, Africa needs to tailor any lessons learned, not least including those of the original Green Revolution of Asia and Latin America. Africa's own diverse challenges and unique conditions need to be addressed in a way that

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[14] The 2010 *The Plundered Planet* is a follow-up on Collier's book *The Bottom Billion* (2007), which made him one of the most influential development economists, together with Jeffrey Sachs and his *The End of Poverty* (2005) and *Common Wealth* (2008) – both contributing to framing the global discourse on poverty and population, climate and development.

[15] Sánchez is a staunch supporter of the African Green Revolution and Yara's Africa program, a former member of the Yara Foundation board, and active participant of the AGR Conferences. He also served as a Co-Chair of the UN Millennium Project Task Force on Hunger, on which Yara as the only private sector actor was a member.

[16] Intervention by Sánchez at the AGR Seminar, hosted by Yara in Oslo, September 2009.

matches its political ambitions and growth demands with broader social and environmental sustainability concerns. This will mean potentially leapfrogging development steps observed in other countries to ensure the best results.

3 Value Chains

In Africa there has been increased attention to – and political support for – developing food value chains. Notably, the AU and the Economic Commission for Africa (ECA) devoted their joint, influential publication on African economic development, the Economic Report on Africa 2009, to value chains.[17]

Pointing to the dominant role of agriculture in African economies, one of the report's main conclusions is the need for "innovative programs for strengthening the linkages between agriculture and other sectors and for promoting agricultural value chains and markets and national and regional levels." African countries, the two key institutions argue, need to form strategic partnerships through regional value chains that enhance investment, trade, marketing, and food security. They add that, in particular, such value chains could promote public-private partnerships – nationally and regionally – to capture the economies of scale and complementarities of diverse resource endowments.

Partnerships are also seen as key to strengthening value chains. In his keynote speech to the African Green Revolution Forum (AGRF)[18] in Accra in September 2010,[19] Kofi Annan, in his capacity as Chairman of the Alliance for a Green Revolution in Africa (AGRA), stressed that "African agriculture must take a quantum leap forward," and that financing – and access to finances for the smallholder farmer – is needed. This, Annan argued, "*all* amounts to change across the value chain," emphasizing that, "partnerships are crucial to success". Underlining the key role of Mr. Annan in the development of the African continent, he also chairs the Africa Progress Panel,[20] which has devoted attention to how business can contribute to development. He argues that the agricultural value chain is key to the development of Africa, citing the agricultural growth corridor concept as a leading example. He argues that greater African participation across the value chain must

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17 AU/ECA, "Developing African Agriculture Through Regional Value Chains", 2009.

18 The AGRF was the successor to the Oslo series of African Green Revolution conferences, 2006–2008, a private sector-led initiative drawing participants from key stakeholders under the theme "Investing in African Agriculture".

19 Kofi Annan, Africa's Green Revolution Forum: Initiating a Quantum Leap Forward, Accra, 2010.

20 The APP was originally formed as a group of eminent persons following up on the commitments made at and after the G8 summit at Gleneagles and the UNK Commission for Africa in 2007.

be secured if sustained economic growth is to be achieved.[21] Following up on its World Development Report 2008 on agriculture, the World Bank in its 2011 strategy document entitled Africa's Future emphasizes the role of agriculture, and that strategic implementation rests on leveraging partnerships, promoting catalytic mechanisms and supporting PPPs.[22]

Concerns have been raised about the possible exclusion of smallholders. Studies of value chains from several continents, including Africa, show that this does not need to be the case, and is not a general feature.[23] Not only are smallholders included in value chains, they are increasingly a part of food retail markets, supplying supermarkets, directly or indirectly. With growing urbanization and affluence, this is a largely untapped potential in Africa. Within the context of the agricultural growth corridors in Africa, the role of smallholders has been given particular attention. Forging greater linkages between modern agribusinesses and smallholder farmers and their communities is considered one of the best ways of contributing to inclusive economic growth on the continent.

The report from the AU and the ECA points out that regional value chains and markets for strategic commodities would not only increase competitiveness of agriculture at the farm level, but also trigger the development of agro-processing and agribusiness ventures at the regional level. This is part of the approach of the agricultural growth corridors, which focus on the local level with an emphasis on smallholders – within a broader, national and regional, framework including a number of sectors, not least the financial.

4 Growth Corridors

At the time these recommendations were presented, the first African agricultural growth corridor was in the making through the formation of an international consortium in 2008, working to establish the Beira Agricultural Growth Corridor (BAGC), and discussions were underway to initiate the Southern Agricultural Growth Corridor of Tanzania (SAGCOT).

The AGC is an initiative that was initially conceived by Yara but subsequently developed in close cooperation with a number of partners, not least the government of Norway, AgDevCo and Prorustica,[24] and with the strong support of both

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[21] Africa Progress Panel, "Doing Good Business in Africa: How Business Can Support Development", 2010.

[22] World Bank, "Africa's Future and the World Bank's Support to It", (2011) is the bank's new strategy for supporting Africa's development.

[23] Swinnen and Maertens, "Finance Through Food and Commodity Value Chains in a Globalized Economy", in this volume, 2013.

[24] AgDevCo is a not-for-profit distribution agricultural development company investing "social venture capital" to create commercially viable agribusiness investments oppor-

the Tanzanian and Mozambican governments, and bilateral partners as well as multilateral donors including NORAD, NORFUND, USAID, DFID, AGRA World Bank, and FAO.[25] Other institutions including TransFarms, Tanzanian Agricultural Partnership, and the NEPAD Business Foundation also played key roles. The concept was originally presented by Yara at the Business Call to Action meeting hosted by the United Kingdom and the UNDP in May 2008, and launched at the private sector forum of the UN General Assembly in September 2008. Since then the initiative has gone on to include not only critical government support – with the individual heads of state in both countries personally championing the framework – but also with strong buy-in from a range of local and international companies and organizations. The initiative has been endorsed by African regional institutions and governments, and support has been rallied through the World Economic Forum (WEF) New Vision for Agriculture. The WEF wasused as a platform to launch the respective investment blueprints: for the BAGC at the Africa regional meeting in Dar es Salaam, May 2010; and for the SAGCOT at the annual meeting in Davos, January 2011.

The basic idea of the AGC is to catalyze the development of rural areas by fostering sustainable agricultural development through value chains with agricultural clusters along existing trunk infrastructure corridors, establishing transformative public-private partnerships and using catalytic financing to attract capital from domestic and international, public and private sources. Relating to the African rural reality, it emphasizes the critical involvement and inclusion of the smallholder sector. Building on the platform initiated at the African Green Revolution conferences, we picked public-private partnerships as the favored strategy to increase investments in the continent's agricultural sector in general, and the corridors in particular. The sector at large as well as the specific corridors calls for large-scale investments covering a range of elements and involving a great number of stakeholders, locally and in a regional perspective. The corridor model is a way of breaking an impasse and catalyzing large volumes of private investments, enabling rural regions to develop and local agriculture to become sustainable – and internationally competitive.

It also provides a framework for other development agendas. Already institutions such as the Alliance for a Green Revolution in Africa (AGRA) have focused much of their breadbasket strategy into these two areas in these countries, while the USAID Feed the Future has also agreed in Tanzania to focus much of its investment into the SAGCOT area to ensure that that the subsequent synergies can be maximized to demonstrate the return on investment potential underpinning the corridor approach.

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tunities, i.a. by taking out front-end risks. Prorustica is a consultancy specializing in fostering growth in agricultural commodity markets through creating partnerships.

[25] Among the first financial supporters of the development of BAGC and SAGCOT were the Norwegian Agency for Development Cooperation, the Norwegian Investment Fund for Developing Countries, the World Bank, USAID, DFID.

4.1 Corridor Clusters

The corridors are drawing on existing physical infrastructure: roads and railways, electricity grids, telecommunications systems. Within the ARC concept, investments will be made bringing infrastructure to the more remote areas, including feeder roads, electricity lines, and bulk water supply, easing farmers' access to inputs and opening output markets, as well as providing crop storage facilities and processing options. Not least important, by harnessing efficiencies in value chains this will lead to smallholders gaining from lower cost of vital inputs and services, such as seeds and fertilizers, electricity and financing. However, the hubs will not only benefit farmers; they are designed to support surrounding communities within a radius of 25 kilometers of the farm hubs with improved roads, water and electricity, and to enhance local job opportunities and provide financial services, including micro-financing and -insurance.

The perceived gains are based on the potential of "competitiveness through clustering"; due to economies of scale, farmers and agribusinesses are most likely to be successful when they are located in proximity to each other and related service providers. Each cluster,[26] containing a number of components (see Fig. 1)

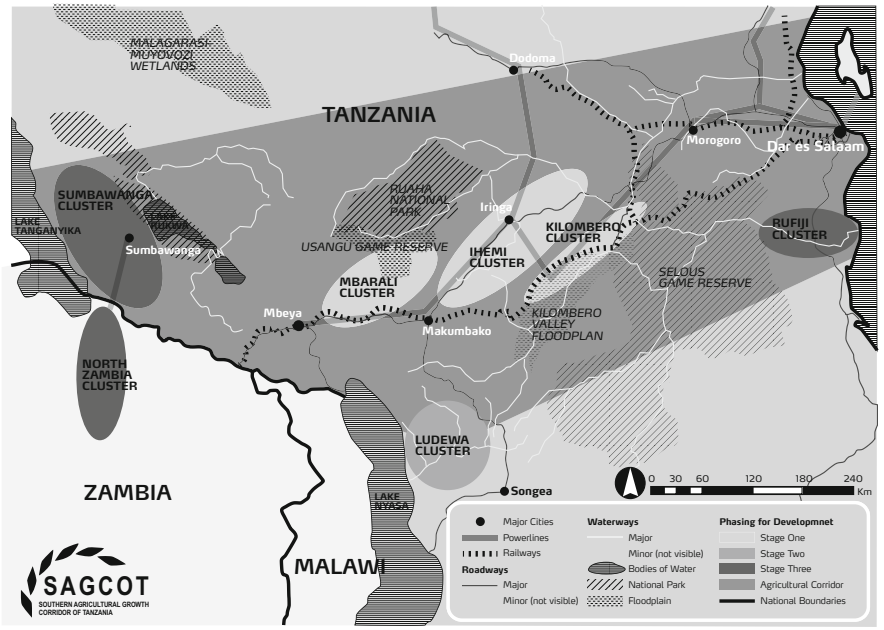

Fig. 1. SAGCOT – Southern Agricultural Growth Corridor of Tanzania

[26] A cluster is defined as geographic concentrations of interconnected companies, specialised suppliers, service providers, and associated institutions.

requires investments along the full agricultural value chain. A typical AGC cluster will include suppliers of farm inputs, machinery, and agriculture support services (extension agents, financial services), commercial farmers (large and small), processors and providers of infrastructure such as irrigation and roads. Clusters also include governmental and other institutions, such as universities, vocational training providers, and trade associations. Cluster development will be driven by the private sector, based on the actual needs and opportunities of the respective areas. Investments in sustainable, productive agriculture will be encouraged throughout the corridors.

Such clusters are considered vital for successful development, not only in Africa. In a 2011 article in the Harvard Business Review, Michael E. Porter and Mark R. Kramer write that: "Clusters are prominent in all successful and growing regional economies and play a crucial role in driving productivity, innovation, and competitiveness." [27] The authors cite the agricultural growth corridors as a leading innovation in the field of creating shared value. During 2009–10, Yara participated with other major companies in the development of the WEF roadmap document New Vision for Agriculture,[28] unveiled in January 2011. Arguing that innovative tools can break bottlenecks in the value chain, and pointing to the BAGC as one example, the roadmap states that: "By coordinating their efforts, stakeholders can mitigate risk, leverage their contributions and build on each other's competencies to harness market forces for sustainable growth," calling for "coordinated investment in an infrastructure system to jumpstart and facilitate rural markets and reduce logistical inefficiencies."

The idea of clusters or hubs is not new, and there is considerable experience to draw upon, as well as support to harness.[29] The World Bank, in its new Africa strategy (Africa's Future), points at the value of clusters, growth poles, and agglomeration externalities when opting to enable small-scale entrepreneurs in agriculture, manufacturing, and services to scale up in a time of rapid urbanization. Developing a new breed of operations, the Growth Poles Project," the bank is set to help African countries deploy a critical mass of reforms, infrastructure investments and skill-building, with a sub-set focused on key agribusiness industry. The

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27 Porter and Kramer, "Creating Shared Value. How to reinvent capitalism – and unleash a wave of innovation and growth", (HBR, January–February 2011), citing Yara's involvement in forging clusters is an example cited as a "good example of a company working to improve framework conditions".

28 Defined as a roadmap for stakeholders, the New Vision for Agriculture is the outcome of a process in which 17 major companies working within the food sector participated, supported by McKinsey & Company. Yara (incl. the author) participated in the Project Board and in the Working Group.

29 Among these is the case of Mali's mango export, boosted through developing a value chain including organizing, transportation, and quality control, enabling fruit from the land-locked country to be shipped out by sea, reducing transportation costs, increasing competitiveness.

bank follows up on its 2008 Agriculture for Development report[30] in the Agriculture Action Plan 2010–2012.[31] Here, the bank points to the need to link farmers to markets and strengthen value chains through targeted investments in market places, rural roads, telecoms (market information) and electrification for agribusiness – and scaling up business models that better enable smallholder farmers to compete in growing higher-value markets. Facilitating agricultural entry and exit, and rural non-farm income, the bank will support regional clustering of economic activity.

4.2 Corridors Established

By 2011, two corridors had been established: the BAGC and the SAGCOT. The choice of initial corridors is based on two main factors: They were identified by the AU as potential regional breadbaskets having the conditions for strong economic development. They received dedicated support from the governments of Mozambique and Tanzania. Both projected corridors have large areas with high agricultural potential as well as a backbone of existing infrastructure.

5 The BAGC

The BAGC has all the natural conditions required for successful agriculture: good soils and climate, access to land and water resources. The major part of the corridor proper, Mozambique to Zimbabwe, contains a large area with huge agricultural potential. Of the ten million hectares of arable land available in the corridor area in Mozambique, only 1.5 million hectares are farmed; only 2 percent is farmed commercially, with less than 0.2 percent under irrigation; 98 percent is farmed by smallholders. About 190,000 hectares of land could be put under irrigation and produce world-class yields, with crops sold profitably in domestic, regional, and international markets. In Mozambique alone, at least 200,000 small-scale farmers are estimated to benefit directly from improved yields and increasing incomes as a result of the corridor; creating 350,000 new jobs and helping move up to one million people out of extreme poverty.

The BAGC is the gateway to south east Africa, linking inland areas of Zambia, Malawi, Zimbabwe, and Mozambique by road and rail networks to shipping facilities at Beira. During the time of apartheid South Africa in the 1980s, the Beira corridor was refurbished as an alternative trade route for Zimbabwe, until falling prey to the war in Mozambique and subsequent collapse of the economy in Zimbabwe. Much of the infrastructure has been repaired, and several major transportation projects are underway, including the Sena railway line to Tete and the port of Beira. The Machipanda rail line to Zimbabwe is operational.

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[30] Here, one of the points made, is that getting agriculture moving, "requires improving access to markets and developing modern market chains".

[31] World Bank, "Agriculture Action Plan 2010–2012", 2010.

The BAGC blueprint calls for total investments of $1.74 billion: An estimated $1.49 billion from the private sector alongside public sector grants and loans of $0.25 billion over a twenty year period.

6 The SAGCOT

The SAGCOT harbors a tremendous potential to increase the agricultural productivity in the region and farm output, especially in Tanzania. It could transform largely subsistence smallholder agriculture into a sustainable commercial farming sector, serving local, regional, and international markets. The Blueprint for Investment aims to bring more than 350,000 hectares into profitable, commercial production, tripling the area's agricultural output. It could lift two million people permanently out of poverty by creating at least 420,000 new employment opportunities within in the agricultural value chain – and bring Tanzania annual farming revenues of an estimated $1.2 billion.

The SAGCOT benefits from existing infrastructure along the traditional trade route linking Tanzania to landlocked countries to the west, especially Zambia, Malawi, and the Congo. This route is also known as the Tazara Corridor, where the Tanzania–Zambia railway line (Tazara), originally built by China in the 1970s, links Dar es Salaam and the Zambian Copper Belt, and where the parallel Tanzania–Zambia highway (Tanzam) and the Tanesco electricity grid run. Building on Tanzania's Kilimo Kwanza (Agriculture First) strategy, the SAGCOT initially focuses on high-potential agricultural land, especially the areas on either side of the infrastructure backbone from Dar es Salaam through Morogoro to Mbeya. The corridor has a varied range of climates and altitudes, and diversity of soil qualities, which allows for a broad scope of crop production, including cereals, horticulture, coffee, tea, sugar, potatoes, banana, beans, vegetables, and sunflowers, as well as for beef, poultry, and dairy.

The SAGCOT blueprint calls for total investments of $3.4 billion; $2.1 billion from the private sector alongside public sector grants and loans of $1.3 billion over a twenty year period.

6.1 Capital Requirements

To finance the corridors, several types of capital and investments are needed. This calls for a rethink by donors and governments as to how they have traditionally financed agriculture. Much more focus is needed on financing the private sector to assist in bridging the early stage development of a commercial model, with smallholders as a key component, to the point that such an investment is ready and can be employed by mainstream commercial investors. Catalytic financing that blends "social venture capital" and match grant financing is sought to support companies and organizations to undertake project development that can be brought to scale; "patient equity" is needed to finance the scalable irrigation infrastructure devel-

opment to farm-gate, catalytic value addition, and post-harvest development; commercial debt and equity is required to invest in on-farm operations, value addition and services; public investments and grants are called on for public infrastructure and targeted support to smallholder farmers.

Aiming to harness total private sector investments to the tune of $3.59 billion for the two corridors combined, a Catalytic Investment Fund (CIF) has been established for each of them: with initial commitments of $15 million for BAGC, and pledged commitments of over $70 million for SAGCOT from players including the World Bank and USAID, the government of Norway and the government of Tanzania itself. In late 2010, the first round of loans to several start-up agriculture businesses in the Beira corridor region was provided by AgDevCo and by the time of going to print 23 catalytic investments had been made under the fund.

However a critical component of the catalytic fund approach is that such financing will leverage in additional private sector investment. Conservative estimates in the case of SAGCOT are that initial catalytic funding and similar investment facilities to the tune of $100 million will leverage an additional private sector financing of $500 million.

To highlight this fact, the first infrastructure investment on the ground was made by Yara, when we launched our $20 million investment into a new fertilizer terminal near the port of Dar es Salaam in January 2011, at the same time as the SAGCOT blueprint was launched. The investment, declared the CEO and President of Yara International ASA Jørgen Ole Haslestad, served to strengthen the company's long-term commitment to the development of Tanzania's agricultural sector. Interestingly, the terminal was a result of an initial invitation from Tanzania to come and help stabilize the fertilizer market. Since then we have developed a constructive dialogue with the government and President Jakaya Kikwete, a strong supporter of the SAGCOT. The fertilizer terminal, with a revolving storage capacity of 45,000 tons, is a crucial component in improving the input supply chain and bringing vital crop nutrition to the interior, through the corridor.

At the same time as easing the access to minerals and helping to stabilize the fertilizer market, the terminal contributes to improve the efficiency of the key regional port of Dar es Salaam. Port efficiency is crucial in international trade, the World Bank states,[32] requiring both institutional and infrastructure investments. In eastern Africa, several countries are land-locked, dependent on the harbors of their neighbors. Not only has trade been complicated by political disputes, the quality of transportation services and the capacity of port handling have often been particularly weak, adding further to the high costs of long transportation routes.

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[32] World Bank, "World Development Report 2010: Reshaping Economic Geography", 2010.

6.2 Agro-Industries

The AU/ECA report points out that regional value chains and markets for strategic commodities would not only increase competitiveness of agriculture at farm level, but also trigger the development of agro-processing and agribusiness ventures at the regional level. This is also the approach of the AGCs, focusing on the local level, within a broader crosscutting – national and regional – framework.

A crucial part of the corridor concept is for an increase in related off-farm economic activities, not least local agro-processing creating jobs and adding value. A related focal area is improvement of storage capacity and the reduction of post-harvest losses. Both interventions are part of the African Development Bank Group's Agricultural Sector Strategy 2010–2014, together with other infrastructural investments, including feeder and community access roads.

Interestingly, the regional economic community, the Common Market for Eastern and Southern Africa (COMESA),[33] has developed an agro-processing sector strategy to capture the full value of production and create employment, reduce poverty levels and increase economic growth. In so doing, the community points to the fact that in developed countries, more than 98 percent of all primary agricultural products are sold to agro-processing facilities, while in the COMESA region, the percentage is only 30.[34] In 2010, the community, together with the International Fertilizer Development Center, announced the formation of the COMESA Regional Agricultural Inputs Program, responding to rising food prices by increasing agricultural productivity through improved access to finance, fertilizer, and seeds.[35]

6.3 Regional Integration

Regional economic integration has been a favored strategy in Africa since the foundation of the OAU in 1963, after most African countries had gained their independence. Still, this is a main ambition, and the agricultural growth corridors contribute to it – and as regional interconnections are key enablers of trade and integration.

The potential for regional trade in Africa is huge, concludes the International Assessment of Agricultural Knowledge, Science and Technology for Development in its study Agriculture at a Crossroads,[36] noting that, "Intraregional trade development in agriculture, formalizing existing informal trade, value addition

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33 COMESA, set up in 1993, comprises 19 member states with a combined population of over 430 million.

34 According to a report by the Technical Center for Agricultural and Rural Cooperation ACP-EU, 16 March 2010.

35 Press Release by the IFDC, 7 December 2010.

36 IAASTD, "Agriculture at a Crossroads", 2009.

and ICT are all largely unexploited trade opportunities." Furthermore, the study argues, "It will be difficult for sub-Saharan Africa to participate more profitably in global trade without establishing a regional presence and national and regional infrastructure for value addition for local producers."

The need for regional integration was reaffirmed as essential for growth and development in Africa by the high-level Joining up Africa Conference in London in 2010,[37] where improved transport corridors enabling better trade and facilitating business development fostering integration was one issue on the agenda. Ensuring that the private sector is more effectively engaged in supporting regional integration, several barriers need to be addressed, the outcome statement notes. It also underlined the promotion of competitiveness and improving investment climates, as well as, "Continued innovation of financial and insurance products to support private investment in Africa, including enhanced guarantees, risk sharing mechanisms and enclave lending."

Today, African countries, on average, trade just about ten percent of their goods with each other, compared to 65 percent of goods traded between European countries.

7 Infrastructure Backbone

The agricultural growth corridors lie on existing infrastructure backbones, which have to be enhanced and extended. Infrastructure is a main prerequisite for economic development, and for agriculture. A number of studies support this analysis. Pointedly, the subtitle of a joint report of the Agence Française de Développement and the World Bank on Africa infrastructure reads: "A Time for Transformation."[38] The report says that the infrastructure networks "increasingly lag behind" those of other developing countries, with power generation representing the largest challenge. Although infrastructural shortcomings represent a major business constraint, depressing productivity, they have been responsible for more than half of Africa's recent improved growth performance, demonstrating the potential for further contribution. According to the Infrastructure Consortium for Africa (ICA),[39] inadequate infrastructure is holding back Africa's economic growth per capita by two percent each year, and reducing firms' productivity by as much as

[37] With high-level participation from key multilateral agencies such as the World Bank, the African Development Bank, and the Economic Commission for Africa, private companies, including Yara (represented by the author) was present at the conference, which aimed to bolster support and promote joined-up action for regional economic integration in Sub-Saharan Africa.

[38] World Bank, "Africa's Infrastructure. A Time for Transformation", 2009.

[39] The ICA was launched at the G8 Gleneagles Summit in 2005, made up of bilateral donors and multilateral agencies, working to scale up investments in African infrastructure, from public, private and public-private sources.

40 percent. "In order for Africa to become competitive, or realize its productive potential," the ICA states, "massive improvements in infrastructure is needed."[40] Adding to the challenge – and the costs – is the fact that Africa is the continent with the greatest number of landlocked countries.

The high cost of transport services represents a major constraining factor for agricultural productivity and profitability. Often at twice the cost of other regions, it increases production and transaction costs making vital inputs such as seeds and fertilizers prohibitively expensive and outputs uncompetitive on the international market. Africa's infrastructure deficit is described by the Center for Stratetgic & International Studies (CSIS) as such: "Physical access to markets is far more restricted among farmers in Africa than among farmers in other regions of the developing rural world. Only a quarter of African farmers are within two hours of markets by motorized transport as compared to nearly half of farmers in Asia and the Pacific and 43 percent for the developing rural world." CSIS also notes that the intensification of African agriculture depends "in a very crucial way" on developing markets and related institutions. In the absence of functioning markets, the center states "rural areas remain trapped in subsistence-oriented economies in which neither the agricultural production sector nor the wider rural economy can grow."[41]

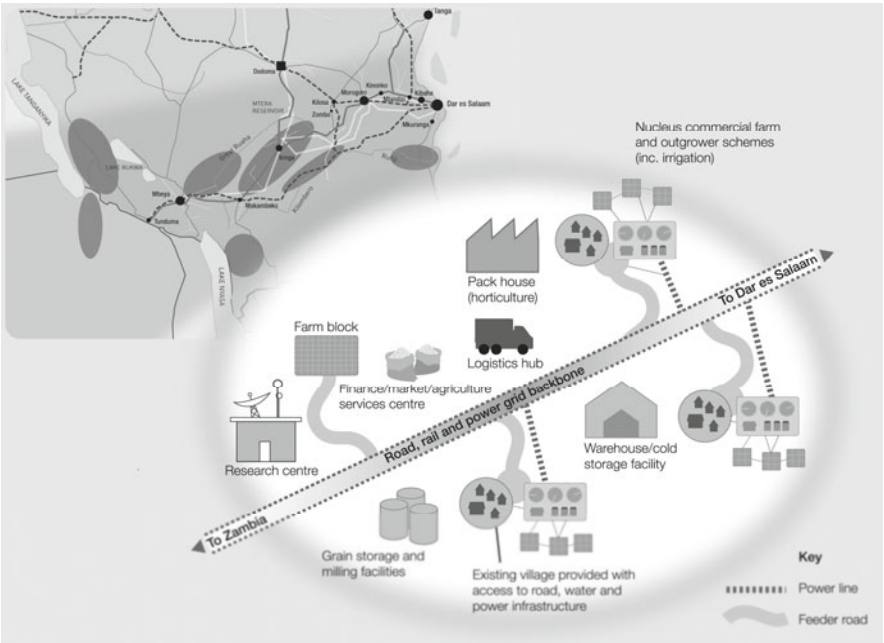

Fig. 2. SAGCOT – Infrastructure backbone

[40] According to the ICA; www.icafrica.org.

[41] CSIS, "Agricultural Productivity in Changing Rural Worlds", 2010.

A critical part of modern infrastructure is not only market access, but market information. Most often cut off from the markets, African smallholders have been at a disadvantage when negotiating the terms of transactions. In recent years, price information – and financial services – are readily available through the extension of ICT, not least mobile phone services such as the M-pesa in Kenya.[42] Through wireless digital technology farmers can also gather agricultural advice, and thus increase their yields.

At the African Green Revolution Forum in Accra in 2010, the president of IFAD, Kanayo F. Nwanze, put it succinctly: "Smallholder farmers need roads and financial services not handouts."

8 Investment Opportunity

Investments in infrastructure alone will not alone transform the agriculture sector and bring the necessary investment. There needs to be considerable attention in developing the kinds of integrated models that will take African agriculture to scale in a sustainable and responsible way. At the same time, any sustainable agricultural development strategy in Africa should also consider the nature of the continent and those who will live there in 20 years.

Transforming Africa's smallholder farmers into a viable economic force and allowing them to form part of market-orientated value chains is one of the biggest challenges we currently face. At the same time this challenge also represents a massive investment opportunity. The agricultural growth corridor model, is by no means the only model and for African agriculture to truly meet its potential a range of different models will need to be developed and compliment each other. It does set out just such a 20-year vision and the kind of integrated investment framework that would make such a transformation possible. By promoting an integrated approach to agricultural development that sees clusters of development being overlaid on to existing infrastructure backbone networks and using catalytic financing and patient capital to runlock greater amounts of local and international investment and to ensure this is done in a sustainable and responsible manner will be critical to ensuring Africa meets its own long term agricultural growth projections. As development within each cluster reaches a critical mass involving both smallholder and commercial farm development, it is expected that the corridor areas will experience a virtuous agricultural growth cycle with increased investment leading to more production, generating a supply chain response and economies of scale that further increase competitiveness, encourage more investment, and result in greater accelerated growth.

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[42] M-Pesa is a mobile-phone based money transfer service offered by Vodafone in Kenya, a concept initially conceived for allowing microfinance borrowers to receive and repay loans by mobile connectivity.

Interviewed by the BBC during the AU summit in Addis Ababa in 2011, the World Bank Vice President for the Africa Region, Obiageli Ezekwesili, championed Africa, noting that the continent offers some of the highest returns on investments anywhere: "It would be a mistake for any corporation not to make Africa an investment destination." [43]

Grow Africa

The agricultural growth corridor initiatives in have recently help inspire the establishment of Grow Africa, Both President Jakaya Kikwete of Tanzania and President Armando Emilio Gueguza of Mozambique, together with a range of other patrons representing leading bilateral and multilateral institutions, agreed to champion this wider platform. Grow Africa is a partnership between the African Union and NEPAD and the World Economic Forums New Vision for Agriculture which in line with national goals defined with the support of CAADP, sees an initial first wave of seven African countries[44] develop a similar transformative public-private approaches to accelerating sustainable agricultural growth, though not necessarily in the form of a corridor.

9 Conclusion

A multitude of sources point to Africa's potential to scale up and improve its competitiveness in agricultural production. The lack of successes seems not to be connected to any one, singular cause, but it is rather a matter of unlocking a grid of entangled challenges to development. From a business point of view, the key is to invest in increased efficiency along the entire value chain. These investments need to be supported by an enabling environment supported by public policy priorities.

Several key views of the agricultural growth corridors address the challenges and may finally bring about lasting change. First, it is taking on a business and market view of agricultural development. A main focus is developing markets that create shared value across the sector, which is necessary to establish sustainable development. Second, a key determinant of success has been the active engagement of leadership in promoting the wider perspective necessary in ensuring the early success of such initiatives. Thirdly, the transformative and crosssector multilevel nature of the partnerships aim to harness the various partners' diverse capabilities to the best advantage. Finally, the innovative and multilayered approach to financing and managing risk is vital to attract private-sector investment. Risk is mitigated through weather-indexed insurance schemes, warehouse receipting, catalytic funding, and patient capital. The cluster approach or hub development add to all of these three perspectives, also adding a social dimension by providing

[43] World Bank press release, 2 February 2011.

[44] Burkina Faso, Ethiopia, Ghana Kenya, Mozambique, Rwanda, Tanzania.

affordable services across the value chain to a wide number of both small holder and medium to large scale farmers alike.

On-the-ground results are only just beginning to appear. At the time of going to print, over 20 initial investments have been made using catalytic financing in Mozambique with similar catalytic investment facility forthcoming in Tanzania. Inspired by Mozambique and Tanzania, the Grow Africa partnership involving a further five countries in a transformative partnership approach to attracting investment into agriculture has also just begun to emerge. This all represents a small start to an ambitious process. Nevertheless, the level of interest raised by the corridor initiatives shows they strike a chord and if nurtured successfully over the medium to longer term could have a significant impact on rural development and food security in the region.

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CHAPTER 5

Innovative Microfinance: Potential for Serving Rural Markets Sustainably*

Richard L. Meyer[1]

Providing sustainable financial services for rural areas and agriculture in developing countries has proven immensely challenging. Billions have been spent to subsidize programs and policies designed to develop financial institutions to serve this neglected market segment. However many of the sector's decision makers and analysts continue to be dissatisfied with the progress. One fairly bright spot has been the increasing penetration of microfinance institutions (MFIs)[2] into rural areas with products and services designed to meet the needs of rural populations and especially the needs of seasonal agricultural production. MFIs face the same challenges of high costs and risks that all financial institutions confront in serving this market, but many innovations are being tested that may eventually yield solutions more attractive for market-oriented sustainable financial institutions.

This chapter summarizes how some MFIs supply finance to rural areas and agriculture. Emphasis is placed on lending even though major advances are occurring in microinsurance, savings mobilization, and payment and remittance services. There is no data base that reports MFI agricultural loans or financial activities in rural areas so this chapter focuses on selected MFIs for which data and studies are available. This chapter also discusses the adjustments MFIs must make as they move away from serving mostly urban and peri-urban clients. Observations about the role of donors and development finance institutions (DFIs) in overcoming barriers conclude the book chapter.

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1 Professor Emeritus at The Ohio State University.

2 The early innovators were frequently NGOs but now many banks and cooperatives offer microfinance services.

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1 Agricultural and Rural Microfinance

1.1 Definitions

The terminology generally follows that of the International Fund for Agricultural Development (IFAD, 2010). The *financial market* includes all financial services for all purposes from all sources in both urban and rural areas. *Rural* generally is defined as geographic areas (villages, towns, small cities) with fewer inhabitants and lower population densities than in larger cities and towns. *Agricultural finance* refers to financial services used throughout the agricultural sector for farming and farm-related activities including input supply, processing, wholesaling, and marketing. *Agricultural credit* is normally provided in cash but some in-kind loans are provided for seed, fertilizer, and other production inputs. *Microfinance* (MF) involves small-size transactions and products specifically designed for low-income households and small scale businesses, often concentrated in urban or densely populated rural areas, but increasingly penetrating more rural locations. *Agricultural microfinance,* therefore, refers to small-size transactions for poor farm households and farm-related businesses while *rural microfinance* encompasses both agricultural and non-agricultural firms and households in rural areas.

1.2 The Subsidized Agricultural Credit Paradigm

In the 1960s to 1980s, old-paradigm, subsidized, directed agricultural credit programs were common in top-down government and donor policies and programs. Unfortunately, attempts to resolve supposed market failure often ended up as government failure.[3] Thus a new financial systems paradigm emerged that contributed to the development of microfinance.[4]

Although there were important exceptions, the old paradigm as employed in many countries had several common features. At the national level, it was believed that economic growth would be accelerated by imposing lending targets on financial institutions and providing incentives for rural branching. At the farm level, the strategy was implemented without careful analysis of the real causes of the supposed credit market failures. Interventions were often considered necessary to induce commercial lenders to supply credit for farmers to adopt Green-Revolution production packages, and artificially low interest rates were justified to accelerate adoption. Credit was often targeted to meet food production targets,

[3] Market failure describes the condition where the allocation of goods and services by a free market is not efficient while government failure occurs when government intervention causes an inefficient allocation of goods and services.

[4] Some of the most comprehensive and accessible publications of the vast literature discussing this evolution include Von Pischke et al. (1983); Adams, et al. (1984); World Bank (1989); Yaron et al, (1997); Conning and Udry (2007). A recent study of the impacts of subsidized credit policies concerns China (Jia, Heidhues and Zeller, 2010).

specialized agricultural development banks and cooperatives were created to deliver loans, interest rates were usually subsidized, and one-size-fits-all credit models were commonly used for lending.

With some exceptions, this paradigm largely failed to meet expectations and there were many unexpected consequences. Increases in lending contributed to some short-term increases in food supplies, but did not lead to sustainable credit supplies. Low interest rates crowded out commercial banks,[5] stimulated excess demand for loans and induced credit rationing that tended to favor richer and politically powerful farmers.[6] High-borrower transaction costs coupled with long delays in credit delivery reduced the advantage of formal loans for farmers relative to informal sources. A combination of low operating margins and poor loan recovery undermined financial institutions; some failed while others required repeated recapitalizations. A bad debt culture developed among borrowers, especially when loans were perceived as coming from the government. Government failure occurred because directed credit failed to resolve the basic screening, incentive, and enforcement problems of rural lending (Hoff and Stiglitz, 1990).

1.3 The Financial Systems Approach

Most old-paradigm programs were discontinued by the 1980s and replaced by the financial systems approach.[7] The term "financial system" covers all: 1) financial institutions; 2) financial markets and instruments; 3) legal and regulatory environment; and 4) financial norms and behavior. Building the system requires developments at three levels: 1) micro: understanding the financial needs and behavior of different clientele, building financial institutions, creating financial products and services; 2) meso: creating infrastructure needed for financial intermediation services; and 3) macro: creating conducive national policies and strategies, complementary non-financial services, and a supportive enabling environment.

Key elements of this new paradigm include:

1. Broadening the view of rural finance to include farming and rural non-farm activities;
2. Recognizing the importance of savings mobilization;
3. Believing market discipline of both financial institutions and clients is reinforced through market interest rates for both savings and credit;

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[5] See Vogel (2005) for a description of crowding out of commercial banks by the Banco Agrario del Peru.

[6] Gonzalez (1984) explained this as a logical outcome of the Iron Law of Interest-Rate Restrictions.

[7] This summary draws from FAO/GTZ (June 1998), Yaron, et al. (1997), and IFAD (2010). The new approach was incorporated into the policies of international agencies in the 1990s (World Bank, 2003).

4. Granting of loans in response to demand rather than supply targets;
5. Evaluating financial institutions for their viability rather than loans disbursed;
6. Recognizing successful finance depends upon favorable macroeconomic, agricultural, and financial sector policies, as well as an appropriate legal framework;
7. Accepting informal finance as complementary rather than usurious and harmful;
8. Believing financial sector reform is essential to improve performance and widen the outreach of financial institutions; and
9. Identifying useful roles for donors to assist in creating a favorable policy environment, improving legal and regulatory frameworks for rural financial markets, building institutional capacity, and supporting innovations to lower transaction costs and improve risk management.

The new paradigm reversed the objective of supplying cheap credit and focused instead on creating sustainable institutions, treating borrowers and savers as clients rather than beneficiaries, and pricing products and services to cover costs and risks. Long-term relationships with clients were encouraged by gradually increasing loan sizes consistent with repayment capacity. The use of credit lines was reduced by donors in favor of grants, loans, and technical assistance supporting product designs, institutions, and policies. The new paradigm contributed importantly to the successes of microfinance and its penetration into rural areas and agriculture.

2 Microfinance Serving Agriculture and Rural Areas

Microfinance is making inroads into serving agriculture and rural areas. This section explains why MFIs are entering this market segment, how they are adapting to it, and summarizes successful examples.

2.1 Reasons for MFIs Expanding into Rural Areas

Some MFIs began with a mission to serve farmers, while others developed by serving urban and peri-urban clients in areas with high population densities and slowly penetrating into rural areas to serve more agricultural and farm clients.[8]

[8] Surprisingly, Gonzalez (August, 2010) found that MFI loan officer productivity was actually higher in rural than in urban MFIs perhaps because client dispersion is not as great as expected.

Over concentration and the need to improve efficiency and sustainability by increasing the scale of operations contributed to expansion into this market segment.

Overconcentration in Some Markets

Overconcentration first emerged where MFIs grew rapidly and became large relative to the total financial market. Bolivia, Uganda, and Bangladesh were important examples (Rhyne, 2001; Wright and Rippey, 2003; Porteous, February 2006). Increased competition can induce positive effects by pressuring MFIs to reduce interest rates, increase loan sizes, introduce new products, and improve client service, but it can also lead to borrowing from two or more lenders simultaneously, excessive indebtedness, and rising loan delinquencies.[9] One solution is for MFIs to seek new markets by expanding into smaller towns, villages, and rural areas.[10]

Improve Efficiency and Sustainability

Since some financial institutions in developing countries realize economies of scale, it is logical to expect similar benefits if MFIs expand.[11] If true, this could produce a win-win situation in which MFIs benefit through lower costs, higher profits, and greater financial sustainability, and customers benefit through reduced interest rates, and greater opportunities for MFIs to serve poorer clients with smaller loans and rural clients located in distant locations. Therefore, increasing scale by horizontal expansion into new rural and agricultural markets could be highly desirable.[12]

Studies testing MFI economies of scale have produced mixed results. For example, Qayyum and Ahmad (no date) found some evidence of MFI economies of scale in Bangladesh, India, and Pakistan. Zacharias (2008) analyzed a sample of MFIs in the 2006 MIX Market data base and concluded that larger MFIs on average appear to be more efficient. Larger portfolios can be achieved by making larger loans but this may conflict with the MFIs' social mission. On the other hand, Gonzalez (2007) studied a larger sample in the 2006 MIX data base and found that scale plays an important role in explaining cost differences for MFIs smaller than 2,000 borrowers, but surprisingly not for larger ones. He also found that as loan sizes grew, there was a significant but decreasing effect on operating costs. There-

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9 Chen, Rasmussen, and Reille (2010) found excessive lending also contributed to rising delinquencies in Nicaragua, Morocco, Bosnia and Herzegovina, and Pakistan.

10 Using MIX data, Gonzalez (June, 2010) concluded there are better possibilities in concentrated markets for high-quality portfolio growth by funding new clients in new branches rather than in attracting new clients in existing locations.

11 Economies of scale refer to advantages that a business realizes through expansion so average production costs per unit fall as the scale of output increases.

12 Economies of scale were also given as a reason for NGOs to transform into formal regulated financial institutions (Ledgerwood and White, 2006).

fore, expansion into new rural markets could have a favorable impact on costs and efficiency, but larger loans in existing markets could produce similar results.

2.2 Required Adjustments in Methodology: Becoming Client Oriented

Most MFIs first achieved success by adopting a fairly standard group lending methodology with joint liability. It was recognized subsequently that lending needed to be more adaptable to client needs. Thus individual lending became more common, instead of or as a complement to group lending. It is better adapted to the heterogeneity of farm households and to the needs of seasonal agriculture. Essentially this change required MFIs to shift from what they can produce to products customers want, from serving the needs of institutions to serving the needs of customers (Woller, 2002). This section highlights changes that MFIs have implemented.

Product Design

The typical MF loan was designed as a one-size-fits-all product easily adopted by urban and rural households with periodic cash inflows, but less so for farmers with seasonal flows. The Grameen Bank inspired the granting of small, annual working capital loans disbursed simultaneously to all group members with each receiving the same or similar amounts. As borrowers establish their creditworthiness, subsequent loans were made in larger amounts (progressive or step loans). The loans were fully amortized, loan installments were collected frequently, often weekly or monthly, and included interest and principal. Interest rates were fixed regardless of loan purpose or size. Even borrowers who repaid early were not eligible for a new loan until all group members repaid. These rigidities facilitated record keeping for paper-based bookkeeping, and borrowers easily understood their obligations, but they also contributed to client exclusion, dropouts, delinquencies, and borrowing simultaneously from multiple MFIs (Meyer, 2002; Wright, 2000). Individual lending helped address these problems.

Individual Lending

Individual lending[13] involves a detailed assessment of the client's financial situation, character, repayment capacity, and his/her business and personal risks. This implies high costs for making the first loan, but costs are expected to decline over time as loan officers accumulate information about clients. Information obtained from applicants regarding their enterprises and expected cash flow determines if a

[13] Some microfinance technical service providers (e.g. IPC in Germany) always advocated individual lending, while other MFIs began with a group model and shifted toward individual lending due to competitive pressures (Churchill, 1999). For example, group lenders in Bolivia began to lose customers when individual lenders moved into the market offering larger loans more quickly for repeat customers (Navajas et al., 2003b).

loan will be granted, the size, duration, and disbursement and repayment schedule. Obtaining good estimates about a farmer's production, yields, and cash flow requires great skill and patience by loan officers.

The question arises about how to achieve good loan recovery without periodic group meetings and joint liability. Some MFIs discard joint liability but use group meetings for collection as paying installments in public pressures borrowers to pay on time. For example, ASA, operating in rural areas of densely populated Bangladesh, was one of the first in that country to reduce joint liability but continue group meetings for recovery (Armendariz and Morduch, 2005). MFIs are experimenting with allowing borrowers to use cell phones to make payments at any time but regular group meetings continue where loan officers collect unpaid installments.

Many MFIs encourage repayment by taking collateral in the form of a co-signer (guarantor) or physical collateral such as livestock, tools and machinery, land even without clear title, and other business and personal assets.[14] Documents such as tax receipts are taken as collateral if they are valuable to clients for other purposes. Thus the notional or use value to the borrower is critical, not the market value of pledged assets (Armendariz and Morduch, 2005). Postdated checks can also be useful in countries where the penalty for issuing checks without funds is severe and immediate compared to the lengthy legal process of seizing and disposing of pledged assets.

Access to future loans is an important incentive for prompt loan payment because repaying becomes more attractive than defaulting. Therefore, MFIs strive to build long-term client relationships, promote the image of long-term stability, quickly extend new loans to borrowers who repay promptly, increase loan sizes consistent with increased debt repayment capacity, and strive to maintain liquidity so clients are not denied loans due to a lack of funds. A limitation, however, is that most MFIs do not yet make term loans critical for larger farm investments (Höllinger, 2004).

Decentralization and Staffing

Individual lending implemented in branches located far from head offices requires decentralization of decision making. Branch managers, credit managers, and field officers require flexibility and authority to make decisions rapidly on loan applications and in amounts and terms to meet heterogeneous farmer demands. Two staffing options have been followed. One option is to conduct in-depth training programs for existing staff that are posted to serve the agricultural and rural market. The other is to hire specialized staff and assign them to exclusively serve this clientele. MIS and supervisory systems must be adapted so managers and loan offi-

[14] Warehouse receipts are used to collateralize stocks of farm commodities and are being introduced in several African countries for food crops where they previously existed for only selected export crops (Coulter, 2009).

cers have the flexibility and authority to respond to local market conditions and conduct oversight and control (Dellien et al., 2005).

MFIs implement different strategies regarding personnel assigned to serve agriculture. Some select their experienced credit officers and give them training in crop and livestock farming, while others hire persons knowledgeable about agriculture and teach them banking. Some prefer to hire staff from the local area with the expectation they will be satisfied to work locally for the long term while others prefer to assign new people who are not encumbered with local family and social obligations. Many MFIs use committees to make loan decisions so younger officers can learn from more experienced ones. Scheduling loan officer work activities must take account of agricultural seasonality, and performance incentives must be adjusted for differences in potential portfolio growth between rural and urban loan officers.[15]

Management Information Systems (MIS)

Many MFIs use paper-based record keeping systems to service thousands of clients in standardized group lending programs, but individual lending requires modern MIS systems for making quality credit decisions, monitoring loans, managing the loan portfolio, and tracking comprehensive data about clients and their businesses. For example, one constraint to the spread of flexible loan products for farmers in Bangladesh was that most MFIs preferred standardized loans that were easier to manage with manual bookkeeping.[16]

Information systems must also provide monitoring and verification reports for use at all levels of MFI operations (Dellien et al., 2005). Field officers need timely repayment reports to follow up immediately with delinquent borrowers. Managers must measure staff output to implement incentive systems, to monitor portfolio composition for desired levels of diversification, and to track loan recovery, rescheduled loans, new loans, and renewals. Dropouts must be identified and appropriate follow up undertaken.

2.3 Successful MFIs Rerving Rural Areas and Agriculture

In the absence of a comprehensive rural finance data base, insights about the magnitude of MFI activities and their performance have to be gleaned from selected

[15] Navajas and Gonzalez-Vega (2003a) present a detailed analysis of the individual lending methodology and incentives used by Financier Calpia in El Salvador (now ProCredit Bank El Salvador) so rural loan officers achieve productivity as high as urban officers.

[16] Some 25 to 30 million borrowers had access to microcredit in 2008 in Bangladesh, but only 1-1.5 million borrowed loans specifically designed for seasonal or investment lending in agriculture compared to a total of six to seven million people engaged in crop farming (Alamgir, 2009).

case studies.[17] This section highlights MFIs for which information concerning their rural operations is readily available. Undoubtedly there are other successful but less well publicized examples.

Three Acclaimed Pioneer Asian Institutions

Three Asian institutions are frequently suggested as models for successfully supplying loans and other financial services in rural areas: Bank for Agriculture and Agricultural Cooperatives (BAAC) in Thailand; village banks (Unit Desas) of Bank Rakyat Indonesia – BRI-UD; and Grameen Bank (GB) in Bangladesh. GB is the only one commonly known as a MFI, but all three reach millions of clients, many of whom are poor, and they serve agriculture directly or indirectly. Their success contributed to the change in the agricultural paradigm.[18]

Common features of the three that contributed to their success include:

- Operating in areas of high population density;
- Reasonably favorable economic, rural and agricultural policies;
- Fair to good rural infrastructure;
- High degree of management autonomy, including charging positive and often high loan interest rates;
- Staff policies that stress training and accountability;
- Innovative and low-cost operating systems;
- Appropriate loan terms and conditions;
- Close monitoring of loan performance;
- MIS adequate to facilitate planning, control, and monitoring;
- Strong savings mobilization to reduce or eliminate the need for external funds.

Several features are noteworthy. BAAC is a state-owned bank created in 1966 that was restricted to agricultural lending until recently. BRI was also state-owned with a network of village banks established as separate profit centers in 1984. GB was established in 1983 as a specialized financial institution with its own banking or-

[17] The annual reports of the 22 ProCredit banks (www.procredit-holding.com) show the agricultural share of their total loan portfolios ranged from less than 1percent to more than 26 percent. Unpublished data for investments made by the Rural Impulse Fund managed by Incofin Fund Management in 22 institutions showed a range of agricultural loans from 1 percent to 77 percent.

[18] There is a large literature about these three institutions by Yaron and other authors. Meyer and Nagarajan (2000) analyzed them in a study of Asian rural finance.

dinance. All three serve millions of clients but in different ways. Grameen pioneered joint liability five-person groups mostly comprised of women, a method subsequently copied widely around the world. BRI-UD uses individual lending while BAAC uses group lending for small loans and individual lending for large loans to reach 80 to 90 percent of farmers in the country, and also lends to cooperatives. GB revised its rigid loan and savings products after the 1998 flood and created the highly successful Grameen II.

BRI-UD has emphasized voluntary savings mobilization and its savings volumes have been double that of outstanding loans, demonstrating that more rural people will benefit from secure places to save than to borrow. BAAC initially relied on government funds and bank loans but savings mobilization slowly expanded. GB was slow to mobilize voluntary savings but under Grameen II introduced attractive savings and pension products. BRI-UD channeled substantial savings and profits to the home office. As a result it had a negative subsidy dependence index (SDI) (it could have lowered interest rates on loans and still covered any subsidies received).[19] The SDI was slightly positive for BAAC because of subsidies, while the SDI was highly positive for GB because of huge subsidies received in its early years.[20]

Surprisingly, the average depth of poverty of the clients served (measured by ratio of average outstanding loans to GDP per capita) was somewhat lower for BAAC and BRI-UD even though Grameen reportedly serves the poor. All three have achieved good loan recovery with relatively few write-offs in spite of financial crises, although GB experienced problems due to the 1998 flood. The three have controlled costs and losses so their interest rates are relatively low compared to MFIs elsewhere.

ProCredit Bank El Salvador (Formerly Financiera Calpia)

ProCredit Bank El Salvador, one of 22 banks of ProCredit Holding, evolved from an NGO in 1988 to become a *financiera* and finally a bank in 2004. It initially served urban micro entrepreneurs but modified its individual lending technology to fit the demands of rural clients beginning in 1992. The initial target area was based on three criteria: accessibility, proximity to a branch office, and secure water supply to minimize crop failure. Technical assistance for designing the technology was provided by the German consulting firm Internationale Projekt Consult (IPC), one of the founding shareholders.

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[19] Yaron (1992) created the SDI to calculate the overall financial cost of operating a financial institution. It is calculated by dividing the annual subsidy received by the annual average interest rate earned on the annual average loan portfolio. A negative SDI implies that the institution has achieved full self-sustainability, while a positive number indicates that interest rates need to be raised to cover the subsidies received.

[20] For the period 1985 to1996, it was estimated that GB would have needed to raise nominal rates on ordinary loans from 20 to 33 percent to become free of subsidies (Morduch, 1999).

Agricultural loans were made for an average of ten months and livestock loans for 15 to 18 months. Interest and partial principal payments were scheduled periodically for clients with the necessary cash flow; otherwise, a single-bullet payment was required at maturity. Annual nominal interest rates ranged between 12 and 27 percent charged on the unpaid loan principal. Disbursements and payments were made in branch offices to minimize potential fraud by loan officers. The bank preferred to hire loan officers around 30 years of age who were about to receive degrees from local universities, with little or no banking experience. Training and/or experience in agriculture was deemed necessary to effectively evaluate loan applicant management capacity, potential yields, and production risks.

Bonuses were an important part of loan officer compensation so efficient officers earned bonuses up to 100 percent of their base salary. The incentive formula consisted of portfolio size, number of borrowers, number of new borrowers, and loan arrears (Navajas and Gonzalez-Vega, 2003a). Incentives generated high productivity but also led to "burn out" of loan officers. IPC replaced the system in 2005 with improvements in benefits and insurance for all employees, rewards of up to two months of salary for exemplary conduct, and profit sharing for selected middle managers (Zeitinger, 2005).

Agricultural loans totaled over US$15 million in 2009, representing about 7.5 percent of the loan portfolio (Annual Report 2009).[21] The bank reported about 76,000 total loans and almost 290,000 deposit accounts. Profits fell compared to 2008 due to the economic downturn so return on equity fell to 2.7 percent. An analysis of rural and urban branches in 2006 revealed that rural loan officers averaged more clients (320 compared to 289) but lower average loan sizes (US$1,130 compared to US$1,686) due to many small agricultural loans. Operating costs were a bit higher (6.2 percent compared to 5.8 percent), but loan loss provisions were lower (1.3 percent compared to 2.9 percent). Rural branches generated an income margin similar to urban branches demonstrating that rural operations could be an attractive business. The bank successfully adapted to problems created by Hurricane Mitch in 1998 and an earthquake in 2001 that damaged homes and affected the living conditions of about 20 percent of the rural customers (Buchenau and Meyer, 2007).

Centenary Bank, Formerly Centenary Rural Development Bank Ltd. (CERUDEB), Uganda

Centenary was established by the Catholic Church of Uganda in 1983 as a trust fund to serve economically disadvantaged people especially in rural areas. It ex-

[21] As of November 2010, the average maturity of agricultural loans had risen to 30 months and livestock loans to 39 months. Total agricultural loans had fallen to just over US$7 million representing only about 4 percent of the total loan portfolio. This decline was due to refocusing the business by selling off all loans equal to or below US$1000, many of which were agricultural (personal correspondence with the bank).

perienced problems, undertook reforms, and was transformed into a commercial bank in 1993. The Catholic Church continues to hold a majority of shares. Individual microlending was developed, including agricultural loan products and procedures patterned after the ProCredit Bank El Salvador, and it became the pioneer bank in making individual loans to small farmers.

Cash flow analysis was used to evaluate borrower repayment capacity. Loans started small at roughly US$60 or less for three to six months, and borrowers could get repeat loans of increasing size and longer term. After three successful loan cycles, borrowers could graduate to "automatic" loans with substantially lower interest rates. Collateral requirements were flexible combining fixed assets and guarantors. Poor customers could provide guarantors, land without a secure title, movable items like livestock, household items including nondurables and business equipment. Software was introduced for computerized loan processing and monitoring, staff performance analysis, calculation of incentives, loan provisioning, and loan tracking (Seibel, 2003).

One branch began agricultural lending in 1998 in an area of small farmers with one to four acres who were raising coffee, maize, horticultural crops, cows, goats, and pigs.[22] Some engaged in processing and petty trade, and most had multiple sources of income. There are two production seasons per year and rainfall is fairly reliable. Loan officer projections of cash flows were used to estimate balance sheets and monthly cash flows. Loan collateral was often customary land titles, livestock, and household goods expected to value a minimum of 150 percent of the loan amount. The initial four loan officers were university graduates of agronomy or agricultural economics with little previous work experience.

In the first season, 388 loans were made averaging about US$200 for an average term of six months, usually with a three-month grace period followed by three equal monthly loan installments. Interest was charged at 1.8 percent per month on the declining balance, an application fee of about US$3 was charged along with a monthly inspection fee of 2 percent, reduced to 0.5 percent for the fourth loan if the borrower made on-time payments for previous loans. Loans were disbursed into saving accounts opened by the borrowers. A special current account was also opened so post-dated checks could be drawn for loan installments. This encouraged good repayment since it is a criminal offense to issue a check with insufficient funds. By the end of that first season, 92 percent of the borrowers repaid in full on time, but several faced difficulties because of low commodity prices, and a few were unwilling to pay. Over 1,000 loans were made in 1999, but arrears were higher because a large harvest depressed commodity prices.

Agricultural lending expanded in 2000 to eight branches with the additional incentive of a donor-funded guaranteed program. New loan officers were hired but much of the lending was done by existing loan officers with little agricultural experience. Many of the new clients were maize farmers recommended through do-

[22] This information about the evolution in agricultural lending is based on interviews undertaken in 2004 (Meyer, Roberts, and Mugume, 2004).

nor projects that also suggested loan sizes, and donor officials approved each loan guaranteed. Due to the guarantee, collateral requirements were reduced, loans were granted to many first-time borrowers, new loans were given to some farmers in default (contrary to the guarantee agreement), and loan sizes tended to be larger. With low maize prices in 2001, arrears shot up, and the bank sought to recover roughly 29 percent of the portfolio from the guarantee. This experience demonstrated how donors can induce financial institutions to over-expand into new markets without adequate experience and trained staff and systems for control and monitoring (Meyer, Roberts, and Mugume, 2004).

Centenary embarked on another reform in 2002 by adding larger loans for medium enterprises as well as corporate finance. The portfolio soon included several hundred commercial loans, enabling the bank to continue growing with many new borrowers. The higher profitability from larger loans was expected to enable the bank to further expand outreach to the poor (Seibel, 2003) but this has not been confirmed. Centenary began to pilot test two-year farm loans in 2008 for purchasing draft animals for cultivation (Roberts and Ocaya, 2009).

Centenary reported 43 billion Uganda shillings in agricultural loans in its 2009 annual report, representing about 12 percent of its total portfolio. Only 8.7 percent of its impaired loans were classified as agricultural, suggesting the earlier recovery problems had been resolved. The MIX Market data for 2009 reports a gross loan portfolio of US$187 million and 109,000 borrowers, deposits totaled more than US$236 million from 875,000 depositors, a 4 percent return on assets, and a 26.1 percent return on equity.

Opportunity International Bank of Malawi

Opportunity International operates regulated MFIs and NGOs in 27 countries, and it is actively testing innovations to expand rural financial access and reduce risk. It provides weather-based index insurance to producers, offers crop, loan, health, life and property insurance through a subsidiary, and is developing a model for m-banking (Berger, 2009).[23] Several innovations are being tested by Opportunity International Bank of Malawi (OIBM). It began operation as a commercial bank in 2003 to serve all market segments as a savings-led institution, although it targets economically active but underserved people in semi-urban and rural areas. Lending is frequently done through "trust groups" of ten to 30 entrepreneurs, usually women. Members undergo four to eight weeks of training before borrowing and provide a group guarantee for each other's loans. Individual loans are available for experienced business owners who provide collateral or a personal guarantor.

[23] Early in 2010, Opportunity announced a US$16 million program co-funded by the Bill & Melinda Gates Foundation and The MasterCard Foundation to provide over 1.4 million people in Sub-Saharan Africa with access to savings accounts and agricultural loans, including more than 90,000 smallholder farmers. Programs operating in Malawi and Ghana will be expanded to other countries.

OIBM expanded into rural areas in 2007. Loans are generally made through farmer groups that contract with crop buyers. The farmers' land and resources are evaluated to estimate profits for loan servicing. The buyers receive the crop, sell it, deduct the cost of inputs, and deposit the balance directly into the borrowers' accounts. Risk mitigating techniques include crop insurance and warehouse receipts. The 2009 Annual Report revealed a gross loan portfolio of US$30.4 million of which 10.5 percent was agricultural. Sixty percent of more than 45,000 borrowers were women. Total savers exceeded 252,000 with deposits of over US$31 million. It achieved operational self-sufficiency and positive profit margins in 2008, but both measures dipped in 2009 while its portfolio at risk > 30 days climbed to 7.25 percent (MIX Market).

Multiple delivery channels to expand financial access are being tested. In 2007, they included: 1) seven fixed outlets (mobile units, kiosks, satellite centers) and two mobile vans; 2) eleven large and ten small scale ATMs; 3) over 1,000 Point of Sale (POS) devices via the Malswitch network (through participating retail outlets, gas stations, agricultural supply shops, competitor banks); and 4) over 100,000 smart cards issued with biometric identification (Kalanda and Campbell, 2008).[24] Testing of electric bicycles (e-bikes) for loan officers began in 2010 (Opportunity Blog, 2010).

The mobile vans are equipped with electrical generators, computers for inputting and backing up data, biometric reading devices, a POS terminal to read smart cards, a webcam to take passbook photographs, and a fingerprint scanner. Security cameras and armed guards ensure safety and GPS tracks vehicle movements. The vans stop once or twice per week at fixed locations so clients can deposit and withdraw funds and make loan payments. They return to branch offices at day's end to upload data into the head office database. Vehicle start up and operating costs are high, but the first van reached 3,000 clients in three months compared to approximately 18 months for a satellite branch (Opuku and Foy, 2008).

Smart cards help solve the challenge of client identification. Most commercial banks require an official identification but there is no national ID card. Driver's licenses and passports cost about US$30 so OIBM and other institutions use Malswitch smart cards to store cardholder fingerprints and a photo to match cards to cardholders. The cards are used to store savings, disburse loans, and make money transfers. A drawback is the cost of about US$7 per card.

Intensive evaluations are being undertaking to improve understanding of how innovations affect access to and impact of financial services. For example, rural market women preferred savings passbooks so they can check balances without using biometric card readers, and some readers in banks do not always read the OIBM cards. The women also found weekly mobile bank visits too infrequent, prompting them to simultaneously maintain savings accounts with commercial

[24] The Bank of Malawi facilitated innovations by introducing a national switching and smart card payment system with biometric fingerprinting identification (Opuku and Foy, March 2008).

banks (Nagarajan, 2010). A baseline study was implemented for use in evaluating the mobile vans and related technology (McGuinness, 2008). Studies will test the value of bringing the bank to customers, offering one-stop-shopping for several financial products, diversifying risks by reaching both poor and non-poor clients, and providing better service. One study assessed the impact of marketing strategies on the uptake of products in areas served by a mobile bank. A marketing campaign using field-based promotion assistants significantly increased new client registrations compared to a mass media campaign (Nagarajan and Adelman, 2010).

An experiment with fingerprinting found that borrowers most likely to default (worst borrowers) raised their repayment rates dramatically, partly as a result of choosing lower loan sizes as well as devoting more agricultural inputs to paprika, the crop intended for the loan. A rough cost-benefit analysis produced favorable returns for the system (Giné et al., 2010). Preliminary analysis of an experiment with commitment savings accounts that allowed customers to restrict access to their funds led to larger amounts of savings and agricultural input use (Brune et al., April 2011).

3 Member-Owned MFIs in Agricultural and Rural Finance

Member-owned financial institutions (MOIs) are important in rural areas of developing countries. Rural people develop and operate a variety of cooperatives, credit unions, self-help groups, rotating saving and credit associations (ROSCAs), village-level savings groups or accumulating savings and credit associations (ASCAs), burial societies, and community funds serving a clientele usually poorer than bank clients. CGAP concluded that commercial banks provide the bulk of rural coverage, but on average only 26 percent of all bank branches are in rural areas compared with 45 percent for cooperatives, 38 percent for specialized state financial institutions, and 42 percent for microfinance institutions (CGAP, 2010).[25] However cooperatives and credit unions tend to be relatively small so their share of total savings and loan accounts also tends to be small (Christen et al., 2004).

Some MOIs achieve impressive outreach, serve rural markets, and reach more distant locations than other types of financial institution. They typically recover their costs and, although often limited in scope, their services respond better to client demand and are less costly for clients than alternatives. Their emphasis on mobilizing savings and lending at lower interest rates sets cooperatives and credit unions apart from other MFIs. They also build institutions that empower communities and create social capital, and have lower-cost, in-depth information about low-income local people that is difficult and costly for outside institutions to acquire. However, they are often highly localized, small scale, and susceptible to lo-

[25] CGAP notes these results likely underestimate the size of the nonbank branch network due to incomplete data.

cal co-variant risks. Frequent fraud and mismanagement limit their scale and continued existence (Hirschland et al., 2008; Zeller, 2006).

Financial cooperatives played important roles in developing agriculture in Western Europe, Canada, and the United States but have a bad reputation in many developing countries because of poor performance and heavy government interference. When properly managed, however, they can achieve success and compete with other financial institutions. This section summarizes examples where their performance in rural areas and in serving agriculture has been more positive.

3.1 Four Cooperative Networks[26]

The World Bank studied four financial cooperative (FC) networks to determine their role in rural finance: Sistema de Cooperativa de Credito (SICREDI) in southern Brazil; SANASA in Sri Lanka; Reseau des Caisses Populaires du Burkina (RCPB) in Burkina Faso; and Kenya Rural Savings and Credit Cooperative Society Union (KERUSSU) in Kenya. Information is not available on farmer membership, but SANASA and RCPB are the largest private providers of financial services in rural areas in their respective countries. Half a million SICREDI members are estimated to be in rural areas of Brazil,[27] and rural FCs serve over a million clients in Kenya. The four networks employ professional staff, serve rural and urban clients with mixed income levels, and reach different levels of outreach to the poor.

Little detailed information is available about individual cooperatives within these networks. Some are reported to be innovative and generate profits while others are slow moving and unprofitable with poor record keeping that puts member savings and share capital at risk. Clientele diversification has been instrumental in achieving rural outreach without sacrificing profitability. FCs within networks with a high degree of integration, such as SICREDI and RCPB, provide broader services with better operational systems and operate better in environments with prudential regulation and financial supervision. Donor assistance should not undermine incentives for members to save, should not support

[26] Two 2007 World Bank documents provide the information highlighted here (Nair and Kloeppinger-Todd, 2007, and World Bank, 2007) and case studies are available for the four networks analyzed.

[27] Huge federal and development banks in Brazil provide most agricultural loans, and the government plays a large role in setting credit policies and providing resources for lending. Financial cooperatives in 2003 accounted for only 6.2 percent of the total volume of rural lending but in some regions were the only financial institution available. SICREDI is the second largest cooperative network in the country, while a smaller network, CRESOL, with 66,000 members targets very small farmers. Loans are made to individuals and generally require similar guarantees as banks. Resources for lending come from the cooperative and the government, but a key success factor has been political independence in spite of government involvement (Brusky, 2007).

operating costs expected to be financed through interest and fees, and is best provided through networks that interact with and/or are members of international cooperative organizations.

3.2 Strengthening Rural Financial Cooperatives

Financial cooperatives often receive technical assistance to strengthen operations, increase rural outreach, and expand financial services to farm households. This section summarizes some examples.

An ambitious program is underway in Mexico where a complex structure of member-owned institutions is estimated to have more than four million members (Gomez Soto and Gonzalez-Vega, 2006). Many are small and perform poorly. The Mexican Secretaria de Agricultura y Ganaderia (SAGARPA) is implementing Proyecto Regional de Asistencia Tecnica al Microfinanciamiento Rural (PATMIR) to provide training and technical assistance. German, Canadian and U.S. cooperative organizations implement it in various locations. They choose among strategies to 1) create new financial institutions; 2) strengthen and consolidate existing institutions; and 3) assist existing institutions to expand into marginalized areas. Aggregate data report number of credit unions assisted, access points created, new members, savings mobilized and loans made, training in financial education and credit union management, and introduction of new technology and management practices. Little information is reported, however, about the performance of individual credit unions or their agricultural operations.

The most detailed information about the Mexican project was provided for WOCCU's Semilla Cooperativa*,* a model emphasizing savings mobilization to link rural members with credit unions. Field officers travel to remote villages to explain the approach and interested persons form groups of ten to 30 people and set a schedule of meetings. The elected president, treasurer, and a spokesperson verify loan application information and collect payments and savings deposits. Field officers issue small loans in the meetings while larger loans are reviewed by the credit union. The model reduces the risk of keeping savings at home and lowers costs and travel time for members who live long distances from credit unions located in larger communities. Participants have full credit union membership, hold the same shares as other members, and can access their accounts at any time. Individual credit unions determine their terms and conditions for loans and savings. The credit products are intended for microbusinesses, but also finance home repairs, emergencies, health care costs and school fees.

New technology, such as personal digital assistants (PDAs) and point-of-sale (POS) devices, is used to increase efficiency and reduce costs. Field officers use PDAs during village visits to enroll members and transmit account data through cell phones to the credit unions. POS devices located at local retailers permit members to access accounts and field officers to deposit cash collected from members. A travel route costing tool utilizing census and cost information (e.g.,

salaries, travel, maintenance) is used to identify cost-effective service routes for both members and credit unions (WOCCU, 2010).

A study found almost 80 percent of PATMIR clients live in towns of less than 10,000; 55 percent are female; 15 percent are illiterate; and they are some of the poorest rural households in the country (Paxton, 2007). Important tradeoffs were found among the different assistance strategies. For example, assisting existing credit unions may generate a rapid increase in membership (breadth of outreach) but the existing culture may not favor adopting new operating methods and increasing access by the poor (depth of outreach). Creating new institutions may resolve these problems but requires longer term subsidization to achieve self-sufficiency.

4 The Role of Donors and DFIs in Overcoming Barriers

MFIs are making inroads in serving rural areas and agricultural clients. The vast array of models and technologies being tested will undoubtedly reveal ways to reduce costs and mitigate risks. Microfinance has benefited immensely from support provided by donors and DFIs, and there are several ways they can usefully contribute to further developments and confront important threats facing the industry. This section identifies these actions**.**

4.1 Political Interventions and Interest Rate Ceilings

Political interventions were common under the subsided agricultural credit paradigm and recent events, such as the No Pago movement in Nicaragua, have begun to threaten microfinance. The liberalization of interest rates was an important reform in many countries following the end of the old paradigm. It provided an important incentive for the microfinance industry because it permitted charging interest rates high enough to cover costs and risks of making small loans to poor people. The highly profitable IPOs of Compartamos in Mexico and SKS Microfinance in India generated a huge debate, however, about the appropriate interest rates to charge poor borrowers. Incidents of suicides by indebted borrowers in Andra Pradesh, India, prompted government officials and politicians to urge borrowers to stop repaying their loans even though the link with microcredit is tenuous (Harper, 2011). Bangladesh announced interest rate caps for microloans at 27 percent, a sign of growing backlash against the industry once hailed as the magic bullet to cure poverty.[28]

International agencies should support efforts to educate and advocate on behalf of market-oriented interest rates. They need to disseminate examples of rates of return in agriculture higher than assumed so cheap interest rates are less critical to

[28] *Financial Times,* November 10, 2010.

borrowers than policy makers expect. Interest rate caps create serious impediments for financial institutions to expand financial services to the poorest, to those living in distant locations, and to farmers operating in risky environments (Campion et al., 2010).

4.2 Subsidize Institutions and Public Goods

Subsidies for institution building and financial infrastructure contributed to the success of microfinance, and are less distorting than interest rate subsidies granted directly to borrowers. The key to reducing interest rates for credit is increased MF efficiency and competition. Subsidies to MFIs for use in designing products and systems and for training and human capital formation contribute to that objective.

Subsidies to create public goods that benefit the entire financial sector may generate even higher returns than subsidies to specific institutions. Examples include improving property rights, collateral registries, credit bureaus, special courts for credit defaulters, and other support institutions. International agencies play a useful role by advocating a long-term approach to financial market development, by conducting analyses to identify gaps in support institutions, and by proposing measures to address them.

4.3 Supporting Networks

National and international microfinance networks are important public goods that facilitate information exchange and the transfer of innovations. Subsidizing tasks, such as designing and testing innovations, may produce larger payoffs when channeled through networks that disseminate innovations to their members. Networks, such as AccessHolding, ACCION, FINCA, Opportunity International, and ProCredit, operate in a hands-on and business-like manner in transferring and evaluating new methods and technologies to their affiliates. Support to CGAP and the MIX Market generates significant benefits because they compile information and make it readily available to the industry. By comparison, the networks for agricultural credit and rural finance to date have been less well developed and would benefit from similar investments and leadership.

4.4 Risk Mitigation

Although the examples discussed above demonstrate MFIs can successfully serve rural areas and agriculture, there are considerable risks involved. The primary way risks are managed by MFIs is by serving a diversified clientele and limiting the agricultural loans in their portfolios. Additional risk mitigating measures are needed. Microinsurance is expanding quickly, and the appropriate roles for the private and public sectors are being explored. Weather index-based crop and livestock insurance is promising but requires support to test and analyze alternative

designs. Major investments are also required to develop networks of weather stations and analyze the data collected. Subsidization may be justified when the lack of private sector initiatives is caused by first-mover problems in which private investors hesitate to invest because of the ease with which competitors can copy their products (Hazell et al., 2010).

4.5 Measure and Evaluate

A vast amount of experimentation is underway to test products, models, and delivery systems for rural and agricultural finance. As described above, Opportunity International in Malawi is but one example of how an institution contributes to expanding financial access by combining the testing of innovations with in-depth evaluation and information dissemination. Donors and DFIs nurture this process when they encourage and finance other institutions to emulate this approach.

Although MFIs conduct a great deal of monitoring and reporting, there is surprisingly little robust evaluation of financial services. Recent studies using random control trials have stimulated soul searching by suggesting that previous evaluations over-stated the contribution of microfinance to poverty reduction (Rosenberg, 2010). This methodological debate diverts attention from the fact that fundamental questions and assumptions about finance have not been adequately studied. For example, is the real value of microcredit the fact that it commits the borrower to a savings plan and helps avoid temptation spending? What non-financial services are critical for credit to produce the desired impacts? Why is the demand for loans often overestimated? Why is farmer uptake of insurance limited without huge subsidies? How well do formal financial services serve the poor compared to traditional informal mechanisms? These questions demand careful and often costly analysis. A larger fraction of the funds currently spent to improve access to financial services should be allocated to rigorous research of fundamental assumptions.

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CHAPTER 6

Busting Agro-Lending Myths and Back to Banking Basics: A Case Study of AccessBank's Agricultural Lending

Michael Jainzik[1] *and Andrew Pospielovsky*[2]

One third of AccessBank's micro-business loans are extended to farmers. The portfolio of this segment has grown quickly and performed well. Why is AccessBank Azerbaijan successful in agricultural lending, a sector often disliked by other commercial banks? And why is the bank viewing farmers as a strategic core clientele? This case study aims to give some answers and explore some of the myths around agricultural lending.

1 Greenfield Small Business Bank in a Transitional Economy

AccessBank was founded in 2002 by international development finance institutions together with a technical partner.[3] It was created to provide a broad range of financial services for micro and small enterprises, and low and middle-income households, sectors that were largely ignored by Azerbaijan's banking sector at the start of the decade. In the intervening years, the bank has grown rapidly into the leading microfinance provider in Azerbaijan, both in terms of numbers of credit and deposit customers, and in terms of credit volume, as well as in terms of range and quality of banking services. At the same time, AccessBank has also developed into one of the leading banks in the country: As of 1 January 2011 AccessBank ranked seventh in terms of total assets ($459 million), sixth in terms of loan portfolio ($340 million), and first in terms of profitability and portfolio

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[3] Current shareholders are Access Microfinance Holding, Black Sea Trade and Development Bank, European Bank for Reconstruction and Development, International Finance Corporation, KfW Development Bank, and LFS Financial Systems GmbH. LFS is a Berlin-based consulting company that is contracted by AccessBank on a continuing basis for the provision of management, technical, and IT services.

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quality.[4] It serves 120,000 credit clients as well as 45,000 deposit clients in 29 branches (14 of which are outside of the capital of Baku).

The Republic of Azerbaijan is considered an "upper-middle-income economy" by the World Bank.[5] The economy is heavily dominated by extractive industries (oil and gas) which are capital intensive, but provide employment for only a small proportion of the population. Instead, the oil and gas-driven trade and current account surpluses have fuelled both inflation and appreciation of the Azerbaijani Manat against foreign currencies, reducing the competitiveness of other sectors of the Azerbaijan economy, inhibiting their growth and development (Dutch Disease). In addition, rampant corruption is widely regarded as one of the key factors inhibiting the development of an efficient market economy in Azerbaijan.[6] These, among other factors, limit the diversification of the economy, which is badly needed to create employment opportunities for a broader strata of the population.[7]

Physical infrastructure, particularly with regard to the road network, and supply of electricity and water is of comparatively good quality, and improving from year to year as oil income is invested into the upgrading of physical infrastructure. Almost all of the villages in Azerbaijan can be reached by roads all year long, which is a favorable element of the local framework conditions for farming. Agricultural land in Azerbaijan was privatized after independence (see Box 1). This clear private ownership of land is also an important prerequisite or facilitation for agricultural lending. However, the environment for farming is not perfect. A generally poor to defunct business environment is regarded as the main obstacle.[8] Farmers

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4 Recently, AccessBank has received a lot of international recognition: It has received the highest rating among all banks in Azerbaijan, see Fitch Ratings (2011). The bank was awarded "Best Bank in Azerbaijan" by Euromoney (2010 & 2011), Global Finance (2011), and The Banker (2011) magazines. AccessBank's extraordinary performance appears especially illustrated by its low Portfolio at Risk (PAR) in times of economic cooling. Whereas Accessbank produced a PAR quota of only 0.85 percent of its gross loan portfolio at the end of 2009 (and 1.00 percent at 2010-end). Hübner (2010) reports that an analysis of the audited financial statements of ten larger local banks showed that 9 of them display a PAR quota higher than the sector-wide official figure of 4.3 percent (published by the Central Bank of Azerbaijan), ranging from 6.5 percent to 20.0 percent.

5 See: http://data.worldbank.org/about/country-classifications.

6 Azerbaijan was ranked 134 of 178 countries in Transparency International's 2010 Corruption Perception Index. International Crisis Group believes that tolerance of corruption and farming out of "rent-seeking rights" acts as pillar preserving unity and obedience within Azerbaijan's ruling elite. See International Crisis Group (2010), pp. 8–10.

7 See Hübner/Jainzik (2009), pp.12-14, for a sketch of the economic structure.

8 World Bank (2005) identified four fundamental problems facing businesses (including farms) in Azerbaijan: weaknesses in the legal and regulatory system; pervasive administrative barriers to investment; weaknesses in infrastructure provision; and corruption. A further basic problem specifically for agriculture has been the extreme weakness of government agencies that should normally be in charge of making and implementing agricultural regulatory policies, such as the Ministry of Agriculture. See Dudwick, et al. (2005).

have access to local markets, mainly via small private traders, but processing and storage is underdeveloped and weak; organized value chains are of limited importance.[9] Producer organizations and professional associations are widely non-existent or weak.[10]

Box 1: Smallholder Farm Structure After Land Reform

Having initially aimed at preserving the Soviet state and collective farm system during the first half of the 1990s, the Azerbaijani government responded to continuously falling outputs and increasing rural poverty with comprehensive land reform and a swing toward market-oriented production. The most important change was the privatization of the 2,043 former state and collective farms. It began with pilots in 1995 and was eventually rolled out on a national scale. About 95 percent of arable farmland was privatized by 2005.[11] By the end of 2010, the government of Azerbaijan considered the process of land reform to be completed with 874,000 families (three-and-a-half million people) having received land as private property.[12] This created a whole new class of private farmers and today's farm structure in Azerbaijan is dominated by smallholder farms. While the land reform is generally evaluated as a success, the amount of land most people received was relatively small and resulted in a fragmented and inefficient agricultural landscape. Today over 85 percent of the rural farm families own less than five hectares of land.[13]

2 Lack of Agricultural Finance

AccessBank has always provided financing to agriculture, but for its first five years of existence AccessBank lacked any dedicated products or specific approach to dealing with the agricultural sector in a coherent and adequate way. As a result, by January 2007 lending to agriculture accounted for only 1.3 percent by amount of the total business loan portfolio ($600,000 out of a portfolio of $47 million) and 5.1 percent in terms of number of loans (719 out of 14,143). As agriculture is estimated to account for 30 percent of GDP and to provide income and employment

[9] Compare World Bank (2005), pp. 27 et sqq. According to the World Bank, this is mainly due to credit constraints for processors and the lack of a effective policy regarding development of a competitive agro-industry: "Little has been done to improve the overall business environment for agriculture or the agribusiness industry to date", World Bank (2005), p. 32. The situation has not changed much since 2005.

[10] See World Bank (2005), pp. 33 sqq.

[11] See World Bank (2005).

[12] See News.az (2010).

[13] See World Bank (2005).

for 45 percent of all households in Azerbaijan, these figures clearly illustrate that the bank had not tapped the market potential.

In actuality, no financial institution in Azerbaijan had tapped this market. At the end of the first half of the last decade, there were practically no useful financial services for farmers and rural households in Azerbaijan. The availability of credit to smallholder farmers was extremely limited, despite of a number of public interventions.[14]

3 Typical Reservations Against Lending to Farmers

Even within AccessBank itself, among management as well as loan officers, there was high reluctance to lend to farmers. Agricultural lending was perceived as being "higher risk" compared to other, non-agricultural business lending. Perceptions in AccessBank reflected standard opinions of bankers who are not familiar with agriculture:

- **Agricultural risks:** External physical factors that have direct negative influence on the production process, such as bad weather or pests, were considered to make agricultural lending much more risk-prone than other types of lending. Additionally, as such risks tend to affect many borrowers at the same time, leading to substantial and unmanageable connected risks. Insurance or other mitigating mechanisms are not developed in Azerbaijan.
- **Longer production cycles and irregular cash flows:** Especially in primary agricultural production where production cycles tend to be long, the bank suspected a lack of reliable repayment capacity due to a lack of cash income in agricultural households. In Azerbaijan in particular, the prevalence of barter transactions and subsistence production was thought to negatively influence the steadiness of the borrowers' cash flow.
- **Price and market risks:** Agricultural products are often subject to severe seasonal and general price fluctuations induced by local, national, or international changes in demand or supply. This can be aggravated by quasi-monopolistic market structures for certain goods (due to locally dominant buyers). Once more, these risks are likely to affect many borrowers at the same time.
- **Affordability of commercial micro-finance interest rates:** Profit margins on investments in agriculture were considered lower than in other sectors, negatively influencing the borrowers' cash-flow and repayment capacity. As a consequence, agricultural entrepreneurs were believed to need subsidized financing.

[14] See Lamberte/Fitchett (2006) for a summary of the rural financial market in Azerbaijan in the first half of the decade.

- **Weakness of collateral.** Rural clients were considered to lack marketable collateral, which results in higher write-off amounts compared to other sectors with stronger collateral.

A second driver of skepticism in regard to agricultural lending was the assumed higher transaction and distribution costs for agricultural lending: As farmers typically live and work in small villages further away from the bank's branches, this increases travel times and costs for bank staff, especially for conducting loan analyses and monitoring. Moreover, it was believed that loans to smallholders would be below the average micro-loan size, which would also increase proportional transaction and distribution costs.

4 Launch of Agro Loan Product

Recognizing the market potential, bank management decided to enter the agricultural financing market, despite concerns over perceived higher risks and distribution costs. In 2007 management accepted technical assistance offered by the German government and financed through the German development bank KfW for developing and piloting a dedicated commercial agricultural loan product.[15] The bank's supervisory board backed management's decision in light of its assumed developmental impact on so-far unbanked rural households. Assisted by consultants from LFS Financial Systems, AccessBank developed a dedicated Agro Loan product for the micro segment (i.e. initially for exposures up to an equivalent of $10,000, later increased to $20,000), and specialist training was developed and provided to loan officers and other bank staff. The product was launched in August 2007 in two pilot branches and subsequently rolled out across AccessBank's branch network in the fourth quarter of 2007 and first quarter of 2008. The Agro Loan product is targeted for households engaged in any type of agricultural activities as well as businesses whose incomes fluctuate due to agricultural cycles (see below).[16]

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[15] The support granted by the German government came to €257,000 and was foreseen and used for a market assessment, product development, and introduction in pilot branches.

[16] Some authors exclude animal husbandry of any kind from the definition of farming. See for instance Harper (2007), pp. 83-84. The reasoning behind this is that animal husbandry is more similar to "typical" micro-loans and often part of rural households' economic activity, particularly in South East Asia, where millions of households are reached with group-based credit schemes. Whereas we do not contest that animal husbandry is easier to handle from a risk perspective (this also reflects in AccessBank's figures – see below) such exclusion appears somehow artificial and ideologically driven. On the one hand, farming businesses in many countries (including Azerbaijan) are diversified in produce and typically combine crop farming and animal husbandry (as well as non-farm income). On the other hand, stock breeding is also exposed to risks which are specific to agriculture (like droughts, floods, pest, or price volatilities) and show co-variant behavior (sometimes co-variant to crop farming also).

The Agro Loan product was based on the existing micro-lending methodology and was fully integrated into the bank's systems from the beginning. The key differences from AccessBank's standard micro-lending include:

- **Specialized training for loan officers:** Loan officers receive specialized training in analyzing agricultural loans. This includes sharing of branch accumulated knowledge on typical yields, typical costs and local prices for the dominant agricultural activities in the branch's operating zone;
- **Use of forecast cash flow analysis of loan repayment capacity:** AccessBank's standard micro loan analysis is based on analyzing current income and expenditure to see if a business generates sufficient cash today to meet proposed loan repayments. As agricultural businesses' income flows are often irregular, and clients often require financing specifically at times when they have no income, the use of the standard analysis methodology would often yield "zero" or insufficient repayment capacity at the time of analysis and lead to rejection of the loan. In such cases, for agro-related businesses with seasonal fluctuations in income streams, AccessBank bases its analysis on forecasts of the clients' cash flows;
- **Grace periods and irregular repayment schedules:** In the case of AccessBank's standard micro loan product loans are repaid in equal monthly installments. Again this can be problematic for some agricultural businesses. Farming based on crops, for instance, may require financing in spring and early summer to fertilize and harvest, while all income may be in late summer and autumn. Under the Agro Loan product customized repayment schedules were permitted to match repayments to income flows of the individual farming households, with multiple grace periods on principal repayments permitted both at the start and at other intervals in the loan cycle (but monthly payment of interest is required throughout loan period);
- **Disbursement in tranches:** Based on the loan purpose, the loan can be disbursed in up to three tranches. This modality, again, can be particularly appropriate for financing activities such as crop production in which several production phases require subsequent financing;
- **Availability of longer maturities:** The longer production cycle in case of agricultural businesses requires frequently longer maturities than in traditional micro-lending. Thus, the maximum maturities were extended for farming clients. Based on the graduation class and collateral offered by the client, repeat loans can be disbursed for as long as 36 months;
- **Informal collateral:** In order to avoid the high costs of formal registration of collateral, for micro-lending (both in the case of the Agro Loans and standard micro-loans) AccessBank accepts household goods, inventory and other personal and business assets, which are pledged in a document con-

cluded between the client and the bank as collateral. The pledging of this collateral is not formally registered with any official entity, and is primarily of psychological value.[17] For Agro Loans, AccessBank expanded the list of eligible collateral to include agricultural vehicles, machinery, and equipment, such as tractors and harvesters (which require a special registration procedure), as well as sheep, cattle, and even future harvests;

- **Long-term collateral agreements and parallel loans:** In the event of the client wishing to borrow larger amounts, AccessBank requires formal registration or real estate collateral.[18] To spread the high costs of obtaining documentation and registration of collateral, Accessbank has such collateral pledged under a long-term collateral agreement with the client (typically for five to ten years) and then individual loans for shorter terms are disbursed under the "umbrella" collateral agreement. This means the collateral is pledged and the associated costs are incurred only once;

- **Pricing of agricultural loan:** Despite the popular belief that agricultural businesses should receive subsidized financing – or despite the argument that agricultural loans should be more expensive because of higher risks and distribution costs – AccessBank decided to price the Agro Loan product exactly the same as its standard micro-lending. This decision was motivated by the fact that most Azerbaijani rural households have diversified income streams. Management was thus concerned that any price differentiation could encourage manipulation of loan applications and presentation of household entrepreneurial activity to qualify for the lower-cost product. This would provoke adverse selection, and potentially misconduct or even corruption of bank staff;

- **Target group:** While the Agro Loan product is aimed at primary agricultural production and is used for all micro agricultural lending, the product is also used to provide financing to any business or entrepreneur that has irregular income flows that are related to agriculture. Typical examples include suppliers of fertilizers or veterinary supplies, or entrepreneurs with agricultural machinery who provide plowing or harvesting services. A more esoteric example may include a household where part of the income is derived from provision of taxi services and part from agriculture. The household may approach the bank for financing to repair or purchase a new

[17] While the bank will seize pledged collateral in the event of default, it is often difficult for the bank to actually sell the collateral and the proceeds rarely cover the outstanding debt.

[18] Real estate as collateral is typically only accepted when situated in urban or peri-urban areas. This is, firstly, due to the fact that many households still lack proper documentation for their land holdings; and secondly, the market for rural and agricultural real estate is undeveloped – a bank will typically find it very difficult to find a buyer on foreclosed property. See further below.

vehicle to continue its taxi activities, but the taxi income on its own may not be sufficient to repay the loan in a short period of time. With the Agro Loan product AccessBank could take into consideration future agricultural income – say from the harvest of a fruit crop, and structure the repayments to match the income stream. In this specific case, the bank would use the Agro Loan product to provide financing, but classify the loan as a "Service-sector" loan.[19] While this specific case is esoteric, it is very common for a rural household in Azerbaijan to have a mix of agricultural and non-agricultural incomes (see below).

5 Results After Introducing the Dedicated Agro Loan Product

The introduction of the Agro Loan product was met by strong client demand. As illustrated in Table 1, in three years, the outstanding balance of the Agro Loan portfolio grew to over 30,000 loans for $50 million equivalent, with a total of over 95,000 loans for $200 million disbursed since inception until end of October 2011 (i.e. a total of $150 million had already been repaid and 65,000 loans completely closed). And in less than three years, AccessBank became the leading lender to agriculture in Azerbaijan. The average loan size at disbursement amounted to the equivalent of $2,300 – approximately one-third less than the average micro-loan.

The success of the Agro Loan product has increased the proportion of lending to the agricultural sector in the bank to 15 percent of the total business portfolio ($50 million) at the October-end 2011 – from 2.1 percent before the launch of the product in July 2007. In terms of number of loans, the proportion increased to 35 percent (28,704) of all business loans, compared to 8.4 percent (1,932) in July 2007. Thus, now more than a third of the bank's business clients are farmers. In many of AccessBank's regional branches, up to half of all business loans are now disbursed to agriculture; in many cases this figure would be even higher if it was not limited by management acting on concerns of portfolio concentration (see below).

The quality of the Agro Loan portfolio has remained excellent. Its Portfolio at Risk (PAR) over 30 days at the October-end of 2011 was 1.05 percent, only

[19] This is the main reason why the data given in the tables for agricultural lending in AccessBank and for the Agro Loan product differ. A second factor is that the Agro Loan product is only used for micro-lending, i.e. exposures up to $20,000 equivalent. For exposures above $20,000, which in AccessBank are referred to as SME loans, the bank does not have a dedicated Agro Loan product as the standard SME lending product already allows for consideration of future cash flows and creation of custom irregular repayment schedules. Thus the data for agricultural lending also includes some SME agricultural lending, that would not appear in the Agro Loan product data – which is specifically a micro-loan product.

Table 1. Development of Agro Loan Product and of Credit to Agriculture ($USD equivalent)

	Agro Loan Product Outstanding Portfolio (at month-end)			Outstanding Portfolio by Sector – Agriculture (at month-end)			
Month	#	Amount (million)	PAR > 30 days	#	% of total loans	Amount	% of total amount
Jan – 07	0	0	0	719	5.1%	0.6	1.3%
Jul – 07	0	0	0	1,932	8.4%	1.6	2.1%
Aug – 07	183	0.3	0	2,142	8.8%	1.9	2.4%
Dec – 07	2,123	3.3	0	3,570	11.8%	4.0	3.9%
Dec – 08	8,995	14.5	0.09%	7,934	16.6%	12.4	6.5%
Dec – 09	24,500	38.3	0.28%	22,086	28.3%	33.9	12.3%
Dec – 10	33,802	49.9	1.37%	31,710	34.4%	46.3	14.8%
Oct – 11	30,034	51.6	1.05%	28,704	35.2%	49.3	15.0%

slightly higher than the 1.0 percent figure for micro-lending as a whole in AccessBank. In total 161 Agro Loans for $493,162 have been written off since the introduction of the product, representing a write-off ratio of 0.34 percent in relation to the total value of all loans fully repaid at the last date of write-off (July 2011).[20] This is in line with the figure across the whole bank of 0.36 percent. What the good portfolio performance does illustrate, from the developmental point of view, is that AccessBank's clients are able to service their loans and are not being overburdened by debt.

6 Agro Loan Product Drives Regional Bank Expansion and Access to Financial Services

The Agro Loan product was also instrumental for the growth and expansion of the AccessBank, especially in the regions of Azerbaijan. The Agro Loan accounted for 35 percent of the micro portfolio growth during the first three-years of its introduction ($50 million out of $144 million growth), and it accounted for 50 percent of the micro portfolio growth in 2010 ($12 million out of $23 million growth). More importantly, as the Agro Loan product increased the portfolio of

[20] It should also be noted that the majority of this write-off – 79 loans for $358,737 – were in association with a fraud case where a criminal client had built a "loan pyramid". While it would be easy to exclude these loans from the total as an exceptional loss, on the basis of experience management has also concluded that the risk of fraud is higher in agricultural lending (see discussion of risk in agricultural lending below) and hence the losses to fraud should be considered in the evaluation of portfolio performance.

regional branches, it has reduced the urban population threshold at which branches become viable for the bank. This has facilitated the expansion of the branch network to towns where the bank would not have previously considered opening branches, greatly expanding access to financial services in rural regions. Prior to the introduction of the Agro Loan product, management considered that a town needed to have a minimum population of approximately 50,000 to make a branch economically viable. With the introduction of the Agro Loan product, this threshold plummeted to towns of approximately 20,000 inhabitants, as the bank can now use these towns as a vantage point to service farmers in the surrounding villages.

This has greatly increased AccessBank's outreach and not just for provision of financing – now a much larger proportion of Azerbaijan's rural population has better access to an AccessBank branch and thus has access to all the target-group oriented services the bank provides, including maintenance of current accounts, savings products, and access to money transfer services. (Remittances from family members working in the capital Baku, or abroad are an important element of the rural economy.)

7 Agro Loans Providing Stability During Crisis

The Agro Loan product also buttressed AccessBank through the economic crisis of 2008–2010: The demand for agricultural financing was not impacted by the economic downturn, nor did the crisis impact on agricultural portfolio quality. Whereas there was a certain deterioration in other business lending segments, particularly in the small and medium loan size segment above $50,000.[21] Thus, the agricultural lending business provides a diversification effect for the bank's asset side that has shown positive effects for the bank's overall economic performance.

8 Busting Agro-Myths

Behind the numbers listed above there are some more interesting conclusions that can be drawn and some "myth-busting" about agricultural lending can be put forward, especially in relation to the bank's original (and globally widespread) perceptions:

Higher transaction and distribution costs: Yes, borrowers are typically located in rural areas further away from the branch, entailing longer travel times for bank staff. However, AccessBank's experience is that this can be more than compensated by the simplicity of analysis of agricultural loans versus standard business loans: After the branch and loan officers acquire sufficient local experience and

[21] Berg/Kirschenmann (2010) have analyzed AccessBank's performance during the crisis on the basis of MIS data from November 2002 to August 2009.

local data, consensuses develop on how much yield and income can be generated by the farmer when he/she operates or cultivates a certain number of cows, sheep, fruit trees, or hectares of a specific crop. Equally, an understanding of standard costs for different farming activities is developed over time. As a consequence, when a bank can systematize such learning about cost and income parameters of agricultural enterprises, agricultural loan analysis often becomes simply a question of:

- Verifying how many cattle, sheep, fruit trees, hectares, etc., the credit applicant has and that they are in a healthy state;
- Assessing what other off-farm or non-farm income, if any, the household may have;[22]
- Assessing what other expenditures and debts the household may have (this is usually simply establishing how many household members are dependent on the income pool).

In contrast, in non-agricultural (urban) micro-loans, the loan officer often has to spend significant time reviewing client's individual sales, purchases and stock to ascertain if the business is profitable and how much cash it is generating. Lastly, in the case of agricultural lending, often a large number of households, sometimes even the majority of households in the village, are engaged in a similar agricultural activity on a similar scale, thus offering high concentrations of potential clients with similar economic characteristics.

AccessBank's experience has been that in the case of agricultural loans, loan officers are often able to "line-up" in advance several clients in one village and do several agricultural loan analyses in one day, while for other micro-businesses the general practice is to perform one analysis per day. Thus in AccessBank we have seen far higher average levels of productivity in regional branches, where loan officers are disbursing agricultural loans than in the Baku metropolitan branches. In 2010, the monthly average for number of loan disbursals per month per loan officer in regional branches was 27, or 27 percent higher than in the metropolitan area of Baku where it was 21. This was balanced off, to a certain extent, by the smaller average loan size of agricultural loans – averaging $2,300, compared to $3,472 for non-agricultural loans (average volumes as of first half of 2010). However, the fact that with typically longer terms and grace periods the outstanding balance of Agro Loans is higher in proportion to the original disbursed amount, compared to

[22] Typically agricultural households in rural Azerbaijan have diversified off-farm or non-farm income. Such income diversification is reported for rural households in many countries. See for instance Haggblade, et al. (2007). Very often at least one member of the Azerbaijani rural household will have regular employment such as a teacher or civil servant; other household members may receive pensions. AccessBank's credit analysis follows a sufficiency-approach (checking if household income and spending allows for the loan amount needed), not a rigorous approach of total completeness and assessing up to the last penny of income from minor sources. Thus, there are no reliable data what percentage of non-farm or off-farm income is generated by farming households.

the typically urban, trade-related micro-loan, Agro Loans also tend to generate more income in relation to the original disbursed amount than standard micro-loans.

Agriculture cannot afford commercial micro-finance interest rates and needs to receive subsidized financing: Demand for financing from agro-businesses has not been a restriction on portfolio growth for AccessBank, despite the fact that Agro Loans are disbursed at exactly the same interest rates as standard micro-loans (originally from 27 percent to 36 percent per annum on actual outstanding balances, reduced to 27 percent to 33 percent in 2011). Analysis of Agro Loan applicants has revealed that many farming activities generate healthy return.[23] This is especially the case when investments are undertaken that lift the farms from the existing – typically rather low– productivity levels to higher standards. Since agriculture remains very primitive, fragmented, and inefficient in Azerbaijan – both in the production, storage, and marketing stages – there is high potential for farmers to capture significant returns on investment if some sort of sophistication and efficiency can be applied. For example, most agro-businesses in Azerbaijan are forced to sell their crops immediately when harvested, when prices are usually lowest, because of the shortage of good storage facilities, especially cold-stores. We have seen many cases of farmers dumping or leaving large portions of their crops to rot. But also regular cyclical investments in "working capital" – such as increasing the number of livestock or purchasing feed – can generate surprisingly high returns (see Box 2).

Box 2: Return of Investment

Returns on farmers' investment. A typical example for sheep and cattle farmers (a very relevant farming activity in many regions of Azerbaijan) is an investment in hay for feeding livestock through the winter months. Bales of hay bought in summer typically cost around AZN 1.50 to 1.75, while in winter the price rises to over AZN 2.5 – an increase of over 66 percent within half a year. A farmer taking a six to ten-month loan from AccessBank in order to purchase the hay they need to feed their livestock through the winter at the height of the summer, will thus typically save themselves anywhere from 33 percent to 50 percent on the cost of feed even after payment of interest. This is a typical example in the case of AccessBank.

[23] Often it is argued that micro-credit is not suitable for agricultural activities because return on investment is lower for agricultural investments than it is for investments in urban trading business and, thus, microcredit is less beneficial for farmers than it is for urban micro-entrepreneurs. See for instance Harper (2007), p. 91. AccessBank does not have comprehensive data on return on investment for the investments it finances, since credit analysis looks at household repayment capacity and not the specific return of single investments. There are some empirical studies that support the finding that return on investment in agriculture as well as non-farm investments of rural households can be substantial. See the different sources named by Meyer (2011), pp. 20-23, and Harper (2007), pp. 87-90.

Based on the experience, AccessBank management believes that Azerbaijani agricultural smallholders can be served sustainably with credits at market conditions.[24] AccessBank's management assessment is supported by the low Portfolio at Risk figures (see above), providing the clearest evidence that agricultural households can afford commercial interest rates. On the contrary, AccessBank believes that subsidized financing is counter-productive as it undermines the market and discourages commercial lending.[25] In Azerbaijan there are government-sponsored agricultural finance facilities that provide financing at substantially below market rates of less than half the interest rates typically charged by AccessBank and other commercial market participants. This creates unrealistic expectations among clients and also discourages commercial lenders who may fear being negatively branded for charging "excessive interest rates."

Weakness of collateral: The perception that rural clients often lack marketable collateral has been partially "busted" by AccessBank's experience and, concurrently, also partially "reinforced." As highlighted above, for micro-lending, AccessBank has developed a methodology for pledging of collateral without formal registration and seeks the pledging of collateral primarily for "psychological" value. In its agricultural credit activities, the bank has found that, in general, agricultural clients can provide comparable collateral to that of non-agricultural clients, for example household goods, agricultural machinery, livestock. Furthermore, as highlighted below, the collateral of agricultural clients, in some cases, can be more liquid than those of standard micro-borrowers; for example livestock can be sold relatively quickly and easily year-round.

However, for larger loans, where AccessBank requires more tangible and formally registered collateral (mainly real estate), the perception has been confirmed and reinforced. Firstly, rural real estate tends to have low market value in Azerbaijan; and secondly rural real estate tends to be illiquid when repossessed and being sold by a bank as residents of villages will not purchase property that has been seized from a fellow villager. Additionally, and actually much more significantly, the state land cadastre and issue of ownership documents in rural regions of Azerbaijan is severely lagging behind that of urban regions. As a result few rural farmers have the necessary ownership documentation that would allow them to pledge their homes or agricultural land as collateral. Obtaining such documentation in Azerbaijan is an expensive endeavor for the customer. Similarly as the formal pledging of real estate in rural regional offices of the state property register is still

[24] This does not say that there is no potential for increasing efficiency in the Azerbaijani market and for lowering interest rates over time. Indeed in 2011 AccessBank was able to decrease its interest rates by three percentage points.

[25] This is certainly no original finding. The effects of subsidized interest rates have been studied and discussed in length. Probably the starting point and well-quoted is Adams et al. (1984) with its several contributions. A recent overview and discussion about subsidies in agricultural lending is provided in Meyer (2011).

a novelty, the unofficial costs of doing so are also reported to be high and it is this, rather than the headline interest rate charged by the bank, that often makes larger loans in rural areas prohibitively expensive.

Agricultural lending carries higher risk than non-agricultural credit: On the face of the Portfolio at Risk figures cited above, the initial conclusion would appear to be that agro-lending is not more risky than lending to other business. However, there are some important qualifications that need to be considered in weighing these figures.

Firstly, AccessBank and Azerbaijani farmers have been very lucky in the last four years. The years since the launch of the Agro Loan product have generally been very good for agriculture in Azerbaijan, with both conducive seasonal conditions and agricultural prices. While 2010 was the weakest out of the last four years for agriculture in Azerbaijan, with heavy rains damaging specific crops in specific regions, it still was not a disastrous year and the majority of crops were harvested (and generally fetching higher prices due to the shortfalls). The worst affected region was the southern central part of Azerbaijan which was affected by flooding of the main Kura river in the spring of 2010. But again, AccessBank was lucky and its losses were minimal as this was one of the last areas in Azerbaijan where the bank had not yet opened a branch and, as a consequence, AccessBank had few clients in this region.[26]

Secondly, while it may seem patronizing to state the obvious, agricultural business and activity is not homogeneous and each activity and household may have different risk profiles and levels. This was quickly recognized in the field by AccessBank's credit staff. In AccessBank monthly bonuses account for the majority of loan officers' and credit line-managers' salaries – these bonuses are based on a number of factors (including number of loans disbursed, outstanding portfolio, plan fulfillment, etc.), but, most importantly, the bonuses are heavily penalized for any arrears.

As a result, the bank's credit staff are highly risk averse and conservative, which has proven to be not a bad thing in the recent global economic turmoil and downturn. As a result, AccessBank credit staff were quick to identify lower risk agricultural activities – or at least agricultural activities that appear to carry lower risk or where the risk is easier to evaluate. Credit officers tended to focus their lending activities on these sub-sectors. In the case of Azerbaijan, such sub-sectors include such activities as the raising of dairy or beef cattle, and medium to large-sized herds of sheep. These activities can provide a relatively constant and regular income stream as milk is sold on a daily basis and mature livestock may be sold year-round (although even in these cases there will still be seasonal price fluctuations). Similarly, as long as the total debt level, relative to the total value of the herd, is kept reasonable, in a worst case scenario the client can always sell off a

[26] AccessBank has, since then, opened branches in this region in Barde in the autumn of 2010 and Imishli in the summer of 2011.

couple heads of livestock to meet a monthly repayment. The income streams and "inventory" of agriculture businesses can thus often be much more reliable and liquid than those of non-agricultural micro businesses and certain agricultural lending can even have significantly lower risk profiles than non-agricultural micro businesses. As a result of this loan officer analysis and behavior, at October-end 2010 loans to farming households based primarily on livestock accounted for 70 percent of the Agro Loan portfolio – high even though sheep and cattle are prime agricultural activities in Azerbaijan – and again these figures would be higher if not limited in some branches by management decree (see below Table 2: Agro Loan Portfolio by Sector/Subsector).

In addition, the bank's risk-averse loan officers have sought to lend to agricultural households with multiple agricultural and non-agricultural income streams, or at the very least, diversified agricultural activity (combinations of crops or mix of crops and livestock providing several income cycles per year). In the event of a failure of one crop, the loan can be restructured and possibly lengthened to match the income cycles of subsequent crops or alternative income sources. The flip-side of this is that AccessBank staff have been reluctant to lend to less diversified farm households focused on one crop or culture – which can actually be a more efficient and productive farming approach. This risk-based selection is reflected in the low level of lending to the "crops" segment (which comprises mainly of grain crops and potatoes. See table below).

Thirdly, the low Portfolio at Risk level for the Agro Loan product, combined with the risk assessment behavior by the bank's loan officers, also reflects the fact that AccessBank faces minimal competition in this sector. Thus, the bank's credit staff is able to "cherry pick" the clients it perceives to have a lower risk profile. In urban non-agricultural lending, AccessBank faces much more competition and cannot be so picky.

Lastly, AccessBank's experience with agricultural lending has also led management to conclude that the risk and potential loss to fraud is high in agricultural lending. The most common and dangerous form of credit fraud in Azerbaijan is clients building "loan pyramids," recruiting other individuals to take loans on their behalf. The individual building the "loan pyramid" promises recruits that they will make all the repayments and will give them a portion of the original loan in return for the recruits "signing the documents." (This is done both sometimes with and without collusion of bank staff.) All is well until the individual constructing the "pyramid" stops making repayments, often absconding with the proceeds of the pyramid. This risk is higher in agricultural lending than in standard business lending as in the latter it is more difficult for someone constructing a "loan pyramid" to find individuals with businesses that would qualify for a business micro-loan. While in the countryside, the majority of households are engaged in agricultural activities and are potential recruits. In addition, it is more difficult for loan officers, management or audit monitoring agricultural loans to identify fraud until the "loan pyramid" collapses – a typical example runs as follows: a client involved in the pyramid is visited and asked what they did with the loan proceeds, they respond that they purchased sheep and when asked where the sheep are, point to a flock on a distant hill. While in the case

of urban businesses greater imagination is required to cover up for missing loan funds. The potential losses are further aggravated by the fact that "repayment strikes" following collapses of such loan pyramids are also more likely to occur in villages where there is greater solidarity among the community than in urban environments. Indeed AccessBank has experienced cases where such repayment strikes have spread in villages to encompass not only participants in the loan pyramid, but other borrowers in the village jumping on the opportunity to deny responsibility for their loans, saying they also gave their loans proceeds to the absconded constructor of the loan pyramid. Similarly, AccessBank has discovered that it is often more difficult to achieve successful prosecution and foreclosure of assets of rural defaulters than urban borrowers. Court officials are less interested in traveling to some distant village to enforce a court order than in the case of urban defaulters and local officials can also be uncooperative in taking actions against their neighbors.

Nevertheless, AccessBank's experience to date has demonstrated that, bar force major situations and fraud, agricultural clients have better repayment discipline than non-agricultural clients. But, the expectation of the management remains that when the bank will have a problem, as the source of the problem is usually related to meteorological factors, disease, or pests, it will affect all or most of farmer clients engaged in the relevant specific agricultural activity in the specific region (covariant risks). And if the problem is related to fraud, it is likely to encompass a larger group of clients and loans than in standard micro-lending and be more difficult to resolve, leading to higher losses.

Table 2. Agro Loan Portfolio by Sector/Subsector as of October-End 2011

	Number of Loans Outstanding		Amount Outstanding	
Sector/Subsector	Number	% of Ag Portfolio	Amount (USD '000)	% of Ag Portfolio
Trade	1,328	4.4%	3,298	6.4%
Service	63	0.2%	137	0.3%
Production	10	0.0%	20	0.0%
Transport	28	0.1%	33	0.1%
Agriculture	28,605	95.2%	48,122	93.2%
Meat/Dairy	20,319	67.7%	36,051	69.9%
Crop	1,673	5.6%	2,441	4.7%
Fruit/Vegetables	5,212	17.4%	7,138	13.8%
Ag Service	527	1.8%	843	1.6%
Others	874	2.9%	1,649	3.2%
Total	**30,034**		**51,610**	

Thus the perception even among the staff and management of AccessBank remains that agricultural lending as a whole carries a higher level of risk and is more difficult to manage. This perception is reinforced by the fact that because losses in agricultural loans tend to be concentrated for the reasons cited above. They are more memorable and remain stronger in the "psyche" of the bank than non-agricultural loan losses, which are typically spread across the bank and time.[27]

9 Risk Management Approach

Risk management and risk mitigation in agricultural lending in AccessBank begins as with all financing – through thorough credit analysis of the farming business undertaken by qualified staff that understands farm economics. This is followed by maintaining responsibility for the performance of the portfolio with the loan officers and line managers who generated the loan through the bonus salary structure that is highly dependent on portfolio quality. This is what management in AccessBank refers to as "Back to Banking Basics": firstly, understanding the risk the bank is taking on, and secondly, AccessBank has not separated the "sales" function from the "risk management" function and kept the "sales-force" responsible for the quality of the business they generate.

However, the need for risk management on a portfolio level also remains in order to protect the bank from unexpected and unbearable defaults due to natural disasters or political risk.[28] AccessBank attempts to mitigate this risk by setting an overall bank limit on credit to the agricultural sector (currently 20 percent) and it applies additional limits on concentrations for specific agricultural activities in specific regions to ensure that risk across the whole portfolio is well-diversified. A certain focus on "lower-risk" agricultural lending (as outlined above) and stronger limits on monocultures in cash crops is mirrored therein. In order to increase its exposure to agriculture over such a healthy limit, the bank would need to rely on a

[27] Whereas the failure of one medium-size loan of $250,000 might be considered painful but somehow part of a bank's business, a flooding that causes the default of 250 farming micro-borrowers with an outstanding balance of $1000 each is likely to attract much more attention. Albeit the final loss might be the same (and also the bank's costs for loan workout), in the case of the micro-borrowers more bank staff gets involved, the failure will be related to media coverage about the natural disaster, there will be political activities around the flooding, et cetera. Such factors will support the perception that agro-lending is more risky, whereas an objective financial examination might not show this. Thus, in agro-lending, there is a constant demand for management to carefully distinguish between risk perception, actual defaults, and loss given defaults in agricultural lending.

[28] Political risks, for instance debt waivers or other types of sudden government action, appear as the most critical risk in agricultural lending since neither the frequency nor the magnitude of such risk can be estimated. See the contribution of Maurer (2013) in this volume.

risk transfer mechanism, like crop insurance or portfolio guarantees. Up to now, these are not available in Azerbaijan.

One last important aspect of AccessBank's inherent risk mitigation strategy for agricultural lending is to serve farming clients with local currency loans, although the economy of Azerbaijan as such is heavily dollarized. Farmers' income is typically in local currency only. By keeping farmers free of foreign exchange rate risks the credit risk for the bank is also reduced. This is particularly important in agricultural lending where maturities tend to be longer and exchange rate variations are not reflected in produce prices in local markets that directly and quickly (in contrast to most imported goods, for instance).

Nevertheless, as the performance of agricultural portfolios can be so heavily impacted by climatic conditions or pests and disease, the true performance of an agricultural loan portfolio and verdicts on relative risks must be made over periods of many years, if not decades. Only time will tell to what extent management has been successful in managing the risk of its agricultural portfolio and, in the case of AccessBank, our verdict on whether agricultural lending carries higher risk is still out.

10 Conclusion

After over four years of extensive lending to the agricultural sector, AccessBank management has learned that the agricultural sector and agricultural lending is multifaceted with different risk profiles and opportunities for risk mitigation. Management has concluded that significant and profitable agricultural loan portfolios can be created and believes that risk can be successfully managed. As with any lending, the key to success lies in diversifying risk and understanding and being able to evaluate the risk profile of each loan, i.e. in training and developing staff and management expertise in agricultural lending and in structuring the business in such a way that loan officers and management accept and maintain responsibility for the loans they disburse.

Nevertheless, even after four years, we are unable to conclusively evaluate the "risk" level of agricultural lending and if this is "higher" or "lower" than for "standard" micro-lending. As acknowledged above, AccessBank has been "lucky" with its agricultural lending with generally favorable climatic and market conditions over the last four years. The performance of agricultural portfolios, due to the impact of climatic factors, probably needs to be assessed over a period of many years, if not decades and further and especially long-term research is needed.

AccessBank's experience also suggest that development agencies and programs that wish to encourage agricultural lending should focus on developments that would permanently help financial institutions mitigate risk in agricultural lending, rather than on subsidizing agricultural lending. Any subsidized lending program is

by default limited, short-term, unsustainable, and only undermines and inhibits the development of commercial lending to farmers.

Examples of developments that would permanently help financial institutions mitigate risk in agricultural lending, drawn from the bank's experience in Azerbaijan include:

1. Development of agricultural insurance to mitigate risk of loss due to meteorological conditions or disease or pests in order to manage risk on a portfolio level – currently unavailable in Azerbaijan;
2. Improvement in cadastre and title register of rural land and issue of correct property ownership documents to rural households – which would give rural residents pledge-able collateral and encourage the developments of a rural real estate market. This in turn should increase the value of rural land and access to finance although the risk appetite for agricultural lending of some financial institutions may still be limited by the difficulty of selling foreclosed rural real estate due to low buyer demand for foreclosed property;
3. Increasing efficiency and lowering costs associated with the registration of immoveable and moveable collateral;
4. Improving profitability of agriculture by demonstration and support of more efficient farming, storage, distribution and marketing technology and techniques (e.g. better seed stock, fertilization, storage facilities, creation of marketing cooperatives, collection points, etc.);[29]
5. Training of management and staff in financial institutions in agricultural finance and facilitating exchanges visits to institutions with successful agricultural lending programs.

AccessBank's experience strongly supports the notion that adapting the technologies of individual micro-lending can unleash a significant potential to serve farming business.[30] This can be an important building block to overcome the lack of investment in smallholder agriculture that is needed to feed the growing world population.[31]

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[29] AccessBank management is encouraged by the fact that in 2010 the shortage of quality storage facilities, especially cold-stores, appears to have been recognised and observed a number of entrepreneurs initiating construction of cold-store facilities across the country.

[30] See Christen/Pearce (2005) for a broader discussion on agricultural microfinance.

[31] See Doran et al., pp. 8 sqq.

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PART III:

Dealing with Risks in Agricultural Finance

CHAPTER 7

Where Is the Risk? Is Agricultural Banking Really More Difficult than Other Sectors?

Klaus Maurer[1]

1 Introduction[2]

Banks and other financial institutions have been extremely reluctant to engage in rural finance – and even more so in agricultural finance – for a number of reasons. The remoteness of rural clients coupled with poor rural infrastructure and lack of branch networks imply a high cost of service delivery and, as a result, profitability is assumed to be low. The other main reason why commercial banks refrain from venturing into rural areas is the "high risk" associated with agricultural lending.

Is the "high risk" *real* and substantiated, or is it only *perceived* by banks? Is agricultural finance really more risky than finance in other sectors? Are the risks in agricultural finance too prohibitively high to be managed? These are some of the main questions of this chapter.

The topic is risk and risk management in agricultural finance. In a first step, the chapter defines, classifies, and analyzes the different types of risks in agricultural finance. A key message is that the *specific* risks of agricultural finance need to be seen and put into perspective with other risks. Based on this distinction, different approaches to risk management are developed. A segmentation of risks into layers serves as a basis for structured risk management solutions that involve the farmers themselves, the markets, and the government. Implications and perspectives are outlined in the final section, including the role of government and donors.

Agriculture and agricultural finance encompasses the whole range of producers and target groups from small, family farm households to specialized, SME-type commercial farmers to large agricultural enterprises and agribusinesses. However, access to finance has been most severely limited for small farmers and – to a cer-

[1] Chairman of the Supervisory Board, Finance in Motion.

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tain extent – for emerging commercial farmers.[3] Therefore, the primary focus of this analysis of risks and the development of risk management strategies is on these hitherto excluded target groups. In addition, smallholders generally constitute the vast majority of farmers in most countries.[4]

2 Risks in Agricultural Finance

2.1 Definitions and Classifications of Risks

Risks in Agriculture Versus Risks in Agricultural Finance

The high risks in agricultural finance are commonly quoted as the main constraint inhibiting financial institutions from lending to agriculture. Before engaging in more in-depth analysis, a distinction must be made between risks in *agriculture* and risks in *agricultural finance*. While the former is concerned with challenges and risks of agricultural production and marketing from the perspective of the farmer (real sector view), the latter reflects challenges and risks of lending to farmers from the viewpoint of a financial institution (financial sector view). Needless to say that both are interlinked, and real-sector risks of agricultural production determine to a large extent the financial-sector risks of agricultural lending. This chapter takes a financial sector perspective and is first of all concerned with the risk of agricultural finance where the specific risks of agricultural production form a sub-set of risks. The focus clearly is on credit risk although rural financial institutions also face other risks such as market, liquidity, and operational risks.

Risks in Agriculture: Principal Risks Versus Specific Risks

The risks that are relevant in agriculture have different characteristics, and they can be classified in very different ways. It is not necessary to opt for any particular classification of risk, and different ones can be used for different purposes.[5] Following Baquet et al. (1997), for example, five major sources of risk in agriculture can be defined (OECD 2009):

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[3] Some even argue that agricultural SMEs and their unmet financial needs constitute the "missing middle of agricultural finance" (Doran et al., 2009).

[4] In the Ukraine, for example, over six million small family farms account for 99 percent of all farmers and for 60 percent of agricultural output, while private commercial farmers comprise only 0.7 percent and large private agricultural enterprises only 0.3 percent in terms of numbers. (World Bank & OECD 2004).

[5] See OECD 2009 for an overview of different classifications of agricultural risk in recent literature.

- *Production risk* concerns variations in crop yields and in livestock production due to weather conditions, diseases, and pests;
- *Market risk* is related to the variations in commodity prices and quantities that can be marketed;
- *Financial risk* relates to the ability to pay bills when due, to have money to continue farming, and to avoid bankruptcy;
- *Legal and environmental risk* concerns the possibility of lawsuits initiated by other businesses or individuals, and changes in government regulation related to environment;
- *Human resources risk* concerns the possibility that family or employees will not be available to provide labor or management to the farming business.

It is clear from the classification above that not all of the risks are specific to agriculture but that some are rather common to all businesses. This is true for most of the financial, legal, and human resources risks. Among the risks that affect agriculture more specifically are production risks (due to weather, pests, and diseases) as well as market and price risks. In recent years, climate change has appeared as a new phenomenon and risk category. Across the globe, it has a considerable influence on agricultural production and in some parts of the world has led to fundamental changes in production patterns and conditions. For the following discussion it is useful to differentiate between these principal (or common) risks and specific risks.

Risks in Agricultural Finance

Fundamentally, the risks in lending essentially hinge on the borrower's capacity and willingness to repay a loan, with the former depending on the viability of the business and the latter on the borrower's character. This is no different in agricultural lending. Here again, it is useful to differentiate between principal and specific risks. The risks in agricultural finance comprise to a considerable extent common risks associated with the viability of the farm business and the farmer's character, not much different from the risks of micro and small businesses in other economic sectors. In addition, farm businesses are exposed to specific production and market risks that may affect their repayment capacity. Finally, given the strategic importance of agriculture for food security, agricultural finance is subject to political interference in many countries. This poses significant political risks to agricultural lending institutions since political interventions often turn out to be detrimental to lending to farmers. Hence, the following sections discuss these three categories: *principal* credit risks, *specific* risks related to agriculture, and *political* risks.

2.2 Principal Credit Risks

Lending to small farmers exposes credit institutions to principal credit risks that are similar to those of micro and small enterprises in general. This is explained by

similar patterns and characteristics of doing business. One characteristic is the high degree of informality as small farmers and enterprises are usually not registered. Household and enterprise activities are not separated. They are characterized by low levels of education and financial literacy. They rarely keep books of accounts and only few are able to produce financial statements. Most household enterprises do not have assets that could be pledged as collateral for loans from financial institutions.

For such businesses, credit institutions are exposed to significant information and monitoring problems. This is due to asymmetric information that exists when one party to a transaction (a lender) has less information than the other party (the borrower), and the resulting problems of moral hazard and adverse selection. Borrower screening and selection pose a tremendous challenge in such a situation. Finally, poor legal frameworks and systems create enormous enforcement problems. On top of all this, the poor state of the physical infrastructure (roads, electricity, telecommunication, etc.) in rural areas in many parts of the world further increases the risk and the cost for rural financial institutions.

Arguably, it is these principal credit risks that have prevented formal financial institutions from providing financial services and have resulted in financial exclusion of large parts of the society. This exclusion applies to micro and small enterprises and small farmers alike.

2.3 Specific Risks in Agriculture

Specific risks in agricultural finance mainly comprise production risk, on the one hand, and market and price risk, on the other hand. Financial institutions around the globe seem to be reluctant to finance agriculture particularly because of the perceived prevalence of these two types of risks.

Production Risk

Production risk in agriculture arises from the high variability of production outcomes. Unlike most other entrepreneurs, farmers cannot predict with certainty the amount of output their production process will yield, because of external factors such as weather, pests, diseases, and other natural calamities. Such events are higher for farmers engaged in monoculture of crops that are particularly sensitive to the correct use of high-quality inputs or the timing of harvesting.

Production risk in agriculture can also be traced to farmers seeking to increase their incomes through higher-risk, higher-return cropping strategies (Christen and Pearce 2005, p.2). The production of most high-yielding crops is relatively complex, involving careful timing of numerous steps— from preparing land through planting, fertilizing, and harvesting. Mistakes or delays at any step can substantially reduce returns—or eliminate them altogether. Moreover, climate change is regarded as steadily increasing the production risk (OECD, 2009).

Market and Price Risks

Market risks are typically more pronounced in agriculture than in other economic sectors. Both input and output price volatility are sources of market risk in agriculture. Prices of agricultural commodities are typically volatile and farmers face a considerable price uncertainty. The price of the harvested output is typically not known at the time of planting when the production decisions are taken. Prices of agricultural commodities vary with levels of production and demand at the time of sale.

Moreover, farmers have no real way of knowing how many others are planting a specific crop or how average yields will fare in any given year. Often, a good price in one year motivates a lot of farmers to move into the same crop the next year. This shift increases production in the face of constant demand, driving down the price and making the crop much less attractive the following year.[6] Christen and Pearce (2005) present the example of Uganda where a bumper maize harvest in 2001 and 2002 caused maize prices (and farmer incomes) to fall, significantly affecting loan repayment.

Segmented agricultural markets are influenced mainly by local supply and demand conditions, while more globally integrated markets are significantly affected by international production dynamics. In local markets, price risk is sometimes mitigated by the "natural hedge" effect, in which an increase (decrease) in annual production tends to decrease (increase) output price, while in integrated markets a reduction in prices is generally not correlated with local supply conditions, and therefore price shocks may affect producers in a more significant way (World Bank, 2005). However, even in local markets, distortions may prevent small farmers from benefitting from the "natural hedge." In many regions and for many crops there is a quasi-monopoly by certain local buyers. This may aggravate farmers' exposure to price and market risks. Furthermore, inelastic demand for many agricultural products is often cited as a main explanation for agricultural price variability where small increases in production can result in large price swings.

The extreme price swings in the global agricultural markets in the past three years has shown how market and price risks can be exacerbated by international market conditions. The hausse of the oil price from around US$10 to over US$150 per barrel in 2008 has dramatically changed the global commodity markets. Since then, crops and oil seeds are increasingly used for the production of ethanol and other biofuels in many parts of the (developed) world. The emergence of the biofuel industry has become a significant factor and price driver in international commodity exchanges. Global markets for staple crops such as wheat, corn, and soybeans have become the "battlefield of three giants," namely the food industry, the animal feed industry, and since recently the biofuel industry. The competition between these industries is likely to increase in the near to medium term and will significantly affect markets and prices across the globe (Rettburg, 2010).

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[6] This phenomenon was already described in 1928 by a German agronomist and became known as "pig cycle", see Hanau (1928).

Finally, governments exert a significant influence on agricultural markets and prices in most countries. These and other interventions are dealt with under political risks in the subsequent section.

Level and Correlation of Production and Market Risks

Production and market risks exist at different levels and scale. Some risk events may occur at the micro level and affect a single farm household only, e.g. hail or fire, while others happen at the macro level and affect entire regions and countries like hurricanes or the recent widespread flooding in Pakistan. In between these two extremes, events of regional magnitude (*meso* level) may affect groups of farm households or communities in certain areas, e.g. floods or landslides.

Another important characteristic is that specific risks are often correlated. Corresponding to the levels described above, the correlation of risks can be located on a continuum from perfectly independent or idiosyncratic at the micro level to perfectly correlated or systemic at the macro level. In between these two poles, covariant risks are generally found at the meso level. Accounting for these correlations is crucial in developing efficient risk management strategies (OECD 2009). It is clear that correlated risks are difficult to pool compared to independent risks.

2.4 Political Risks

For governments in both developed and developing countries, agriculture is a strategic sector. Ensuring food security is high on the political agenda. In addition, agricultural commodities and products are a major export earner in many developing countries. Moreover, the agricultural sector often provides employment and income to a majority of the rural or total population and contributes significantly to GDP. This explains the highly political nature of agricultural sector in general and agricultural finance in particular, and the considerable degree of government interventions and interference in the sector.

Most countries have experienced politically motivated interventions and undue interference from government and politicians. Government interventions are directed either at the real sector, i.e. agricultural production and marketing, and/or at the financial sector, i.e. agricultural finance. Both types of interventions constitute a major political risk for financial institutions engaged in agricultural lending.

In many countries, the adequate and affordable supply of staple food crops to the growing urban population has been the primary rationale for interventions. Hence, price controls and subsidies with the focus on local urban consumers have been on the top of the menu of real sector interventions, often at the detriment of the rural population and the agricultural producers. In the past, many governments have directly engaged in the marketing of certain crops, primarily cash crops for export, by establishing state-run marketing boards and warehouses with direct price control. However many of these have disappeared in recent years.

The creation or removal of tariff barriers can dramatically change local prices as the example of Ghana shows (Christen and Pearce, 2005). In the 1990s, the Ghanaian government introduced a limited exemption from import duties on white maize in response to a crop forecast—which later proved incorrect—that predicted a major food shortage. As a result, market prices for maize were depressed in Ghana for two years. Another most recent example of the effect of political intervention on crop prices has been the Russian prime minister Vladimir Putin's decision to ban Russian wheat exports following the drought and widespread fires last summer – combined with irrational market psychology – has caused wheat prices to double in international markets from US$4 to US$8 per bushel within a few weeks.

The record of government interventions in the financial sector or agricultural finance is equally long (and discouraging). While most of the features from the era of supply-led agricultural finance with state-owned agricultural development banks and massive subsidized credit programs belong to the past, agricultural finance and the financial institutions engaged in the sector continue to be target of interventions. The imposition of lending quotas and interest rate ceilings are common features in many countries. Unrealistic limits on interest rates and interest margins discourage or inhibit financial institutions from engaging in rural and agricultural lending that involves high transaction costs. Even more serious are populist interventions such as farm debt relief and debt forgiveness programs. Such populist measures expose rural and agricultural lending institutions to considerable risk.

A striking example in this regard is Thailand where the populist Thaksin government announced a debt moratorium for small farmers in 2001 that seriously affected the Bank for Agriculture and Agricultural Cooperatives (BAAC). More than two million farmers owing over US$1.7 billion—a third of BAAC's portfolio— enrolled in the program. As a result, BAAC's loan write-off rate jumped from three percent in 2001 to 12 percent in 2002, and its reserves for bad debt rose to 21 percent of its loan portfolio. (Christen and Pearce, 2005)

Another recent case occurred in India in February 2008 when the government announced a comprehensive loan waiver for small farmers, which has been primarily executed by the credit cooperatives. Preliminary data indicate that approximately 369,000 farmers have benefited from the debt forgiveness. One of the immediate impacts has been a steep drop in the recovery rates. Moreover, it has negatively affected the overall credit culture: a recent survey showed that one out of every four respondents want to wait for another loan waiver.

2.5 Empirical Evidence on Actual Risks

The literature reviewed, unfortunately, does not provide any empirical evidence on the types of risks that do actually cause losses for farmers and financial institutions. Specifically, no data have been found to confirm the argument that agricultural loans are more risky than others (Meyer, 2011). There are occasional in-

stances and examples of floods or droughts in certain regions that have led to non-performing loans or even defaults.[7] However, other anecdotal evidence suggests that the main reasons for default of small farmers are like with any other micro or small business, e.g. the death of the owner, fire, or obvious cases of moral hazard and unwillingness to repay. In other words, it seems that in an overall perspective the principal risks matter more than the specific risks of agriculture.

3 Approaches to Risk Management in Agricultural Finance

Different types of risk call for different risk management approaches. This section sheds light on how *principal*, *specific,* and *political* risks in agricultural finance can be best managed.

3.1 Managing *Principal* Credit Risks

Typical Risk Management Mechanisms and Their Limitations

Rural and agricultural lending institutions have developed a number of mechanisms and techniques for managing the risks that arise from farmers' inability and/or unwillingness to repay their loans. For addressing the individual credit risk, there are two broad approaches: appraisal of repayment capacity and asset-backed lending. The former approach focuses on analyzing the debt capacity of a potential borrower using either human experts or statistical models, while the latter focuses on the quality and quantity of assets that can be pledged as collateral and how quickly that collateral can be liquidated in the event of a default (Wenner, 2010). Frequently, a combination of both approaches can be found.

Asset-Backed Lending: Focus on Collateral

Many financial institutions, especially commercial banks, pursue an asset-backed lending approach and require hard collateral as prime protection against default. In general, they require immovable assets – i.e. land – to be pledged as collateral, especially from farmers whose major – if not sole – productive asset is land. For this reason, land as collateral has an important psychological effect on borrowers' behavior because it functions as a powerful incentive device for maintaining the repayment morale.

However, the reality in most countries severely limits the collateral options. Firstly, formal collateral in the form of land titles is rarely available. In most

[7] Examples are Morocco where the Gharb region was flooded for two consecutive years and the leading MFI Al Amana saw an increase of PAR in that region. Also in Mali in the Sikasso region, BNDA had high defaults from potato growers following floods in 2009. Source: personal communication with Christine Westercamp.

cases, land is not formally registered, ownership is unclear, and property rights are insecure. Secondly, even when land titles are available, contract enforcement opportunities are poor. In rural communities it is very difficult if not impossible to liquidate and sell land as nobody would acquire land that belonged to a neighbor. This is currently experienced by Kreditimi rural I Kosoves (KrK), a rural MFI in Kosovo that has piled up land titles and even movable assets such as vehicles, which it finds almost impossible to sell in the rural community.[8] Thirdly, small farmers are extremely reluctant to pledge land as collateral in fear of loss. A loss of land would wipe out the basis for existence. Fourthly, the formal registration of collateral titles can be very costly relative to the small loan sizes. As a result, the overemphasis on immovable collateral (land) has led to significant financial exclusion especially among small farmers.

Most lending institutions are reluctant to accept movable assets such as agricultural machinery, equipment, and vehicles as collateral due to the absence of secured transactions frameworks and collateral registries for movable assets in many countries. The same applies to alternative forms of collateral, e.g. livestock, standing crop (future harvest), or household equipment that farmers would be more easily prepared to pledge as collateral.

Expert-Based Appraisal of Repayment Capacity

Assessing repayment capacity requires a thorough understanding of the agricultural business, and of the risks and factors that determine success or failure. Agricultural lending requires specific technical expertise among loan officers and credit staff, capable of conducting the financial analysis of the borrower and structuring a loan that is tailored to the cash flow of the business. Agriculture requires a wide range of expertise, given the variety of crops and production methods; therefore, an expert-based evaluation system is expensive to both develop and maintain. In addition, technical expertise needs to match with adequate products and systems, for example with information technology (IT).

The inclusion of agricultural experts among credit staff has frequently led to an overly technical lending approach. The technical experts focused on agricultural "projects" as stand-alone activity, often isolated from the farm household economy, and developed differentiated loan products for different crops, i.e. "crop loans." Such "project finance" approach, however, is not appropriate for micro and small farmers; this has been a key lesson from successful microfinance institutions that apply a holistic approach to farm household enterprises.

In addition to these mechanisms with focus on individual credit risk, financial institutions have developed risk management tools at the portfolio level such as diversification, exposure limits, and loan loss reserves.

[8] Author's personal insight as member of the Board of Directors of KrK.

Portfolio Management: Exposure Limits and Diversification

Successful rural financial institutions engage in active portfolio management (1) by setting exposure limits for agricultural loans in the overall portfolio and (2) through diversification of their portfolios. For example, recent survey data in Latin America found that the average exposure to agriculture is less than 40 percent of the total portfolio (Wenner, 2010). Microfinance institutions tend to limit agricultural lending to less than one-third of their portfolios (Christen and Pearce 2005). Portfolio diversification is done in two ways. Firstly, diversification of the agricultural loans by geographic region, commodity, and type of farm household. However, due to covariant and systemic risks this technique can be implemented only by large institutions that operate in more than one agro-climatic zone. Secondly, diversification beyond agriculture to include off-farm and non-farm activities and enterprises.

Building Risk Reserves: Loan Loss Provisioning

Building risk reserves in the form of loan loss provisions, i.e. an internal absorption of credit risk, is the last line of defense for a financial institution. It is also the most costly measure as it negatively impacts profitability. This will of course depend on the prevailing regulations on loan classification and provisioning. Risk-based supervision norms that allow specific provisions are not yet prevalent in many developing countries.

The above mentioned typical risk management techniques are useful but they can only partially address the information, monitoring, incentive, and enforcement problems that prevent agricultural finance from reaching small and informal farmers in rural areas.

Lessons Learned from Successful Agricultural Lenders

While most of the state-owned agricultural development banks – agents of the "old paradigm" of agricultural finance – have failed, there are a few examples that have survived and been transformed into successful rural and agricultural lending institutions. The most notable cases are the Bank for Agriculture and Agricultural Cooperatives (BAAC) in Thailand and Bank Rakyat Indonesia (BRI).[9] Both of these banks have developed systems and mechanisms that enabled them to manage the risks of lending to small farmers.

During the 1980s and 1990s, both banks made the decisive shift from agricultural credit to rural finance. This shift had two dimensions: (1) moving from credit-only institutions to full-service financial intermediaries with the introduction of savings facilities as an important financial service needed and demanded by farm households; and (2) a diversification from agricultural credit to rural credit for off- and non-farm activities and households. These two features have been essential for better managing the risks described above.

[9] Literature on BRI: M. Robinson (2001), Maurer (2004) and on BAAC: Yaron (1992), Maurer (2000).

In response to the collateral problem – many farmers did not have the legal documents showing proof of land ownership – BAAC developed a mechanism of *joint liability groups*, and this became an effective risk management device (risk pooling) and the trade-mark of BAAC's lending operations. Client farmers were asked to form small, informal groups of about 15 members that serve to guarantee the individual farmer's loans. However, BAAC does not extend group loans. All transactions are conducted with the individual members. The groups help BAAC in borrower screening, loan appraisal, and verification of data about loan applicants, as well as to maintain repayment discipline. In this way, BAAC reached more than 3.5 million small farmers organized in over 230,000 groups (Maurer, 2000).

The list of lessons to be learned from these two banks extends further. In fact, many rural and agricultural finance institutions from around the world have visited BRI and BAAC and have adopted successful elements in their own institutions.

Contractual Arrangements and Agricultural Value Chains

Interlinked contracts and agricultural value chains are features that have received increased attention. Interlinked transactions between farmers and buyers and intermediaries in agricultural value chains can significantly ameliorate asymmetric information and the problems of moral hazard and adverse selection, and hence reduce the risk for external lenders.

Financial services can be linked or embedded in value chains. Traders, processors, and other agribusinesses frequently supply internal finance along the chain by linking credit to the delivery of inputs or subsequent sale of produce. However, value chain finance has so far been mainly concentrated in higher-value export crops or commodities rather than in staple food production for local or regional markets. (Doran et al., 2009; Swinnen, 2011)

Lessons Learned from Rural Microfinance

Microfinance emerged in the late 1970s and 1980s and has since revolutionized traditional views by showing that the poor are bankable (Nagarajan and Meyer, 2005). Microfinance institutions (MFIs) developed a specific microcredit technology that has been highly effective in managing the principal risks of lending to small and informal household enterprises. This was further supported by an efficient organization, and standardized products and procedures that kept the cost of administering many small loans at reasonable levels.

Cash flow-based lending has proven a successful methodology for microenterprises that have little or no assets, while tiny and very small loans have been extended to very poor households for livelihood activities through a character-based lending methodology. In fact, many MFIs use a combination of both methodologies. A key factor is the holistic view of the household enterprise and the recognition that the line between "productive" and "consumptive" expenses is blurred. As a consequence, micro loans are for general purpose and not for a specific "project," which in any case is an alien concept to informal household enterprises. This

takes into account the fact that most household enterprises – including small farm households – have multiple economic activities and income sources as part of their own risk management strategy, as shown in the next section.

Overall, microfinance has shown that it is possible to manage the principal risks that arise from the fundamental information, monitoring, incentive, and enforcement problems that exist in the rural and informal sector economies in developing countries. However, the other side of the coin is the high administrative cost of these successful risk management efforts in microfinance and the resulting, relatively high lending rates required to cover this cost. It is not clear whether all farming activities allow to pay such rates. Little analysis has been conducted in recent years on rates of return earned in farming relative to interest rates on loans. However, empirical studies of the productivity in agriculture and the use of inputs like fertilizer suggest the possibility of earning higher returns in agriculture (Meyer, 2011).

The other caveat is that standard microfinance technology offers only a partial solution for advancing agricultural finance. Most microfinance programs until now offer only short-term credit and require regular repayment in weekly or monthly installments that are most suitable for small traders and microenterprises in the service sector but are less appropriate for agricultural production and investment. Hence, adaptations and fine-tuning to the needs of small farmers will be required.

Emergence of a New Paradigm in Rural Finance

Based on the lessons learned from the old paradigm, from successful agricultural lenders, and from the microfinance revolution, a new rural finance paradigm emerged in the mid-1990s and is still being fine-tuned. This new paradigm reflects a financial systems approach, using market principles to deliver financial services aimed at rural development and poverty reduction (Nagarajan and Meyer, 2005). In terms of risk management, a model is emerging that combines the most relevant and promising features of conventional risk management, traditional agricultural finance, and microfinance. With this combination, rural financial institutions are able to successfully manage the risks of lending to rural microenterprises and households – including farm households – to a large extent. The challenge remains to adequately account for the specific risks in agriculture – as well as the political risks – and to integrate these in a comprehensive risk management approach.

3.2 Approaches to Manage the Specific Risks in Agriculture

Financial institutions are particularly reluctant to assume the specific risks in agriculture, i.e. the uncontrolled production and market risks, as these translate into credit risks that are more difficult to manage. As a consequence, banks seek to share or, more preferably, to transfer these risks to third parties. The following sections therefore look at potential risk sharing and risk transfer mechanisms from a conceptual angle.

Segmenting Risks into Layers

A basic risk management technique consists of segmenting risk into different layers. This segmentation may help to match each set of risks with different "buyers" of risk or available risk management mechanisms (World Bank, 2005). These layers can be defined along a set of risk characteristics: (1) the level of risk (micro, meso, macro); (2) the degree of correlation (idiosyncratic, covariant, systemic); (3) the probability of occurrence (frequent, less frequent, seldom); and (4) the magnitude of the losses (low, medium, high) (see Appendix 1).

The first layer refers to losses that are part of the normal business environment for an individual farmer (micro level). They are very frequent but cause relatively limited losses, for example small weather shocks such as hail. Farmers should themselves assume and manage this type of risk with the instruments and strategies that are available at the farm, household or community level. This is "normal risk" or *risk retention layer*.

The second layer corresponds to risks at the meso level that are more significant and less frequent. However, both frequency and magnitude are in a middle range affecting groups of farmers or communities, for example a severe weather shock leading to floods. In this layer there is scope for farmers to use specific market instruments such as insurance or options that are particularly designed to deal with farming risk, as far as these are available. This is the *market solutions (insurance) layer*.

The third layer comprises risks that are catastrophic in nature because they generate very large losses, even if their frequency is low, for example hurricanes or widespread drought. This type of risk is more difficult to share or pool through the market mechanism, particularly if it is systemic. For example, the loss and damage caused by the Tsunami in Indonesia led to insolvency of one of the largest insurance company in Indonesia. There is a role for government, with the assistance of the international donor community, in the case of catastrophic risk. This is the *market failure layer*.

Risk Retention by Farmers: Prevention, Mitigation and Coping Strategies

Farmers typically manage the "normal" risk of the first layer with "self-protection" or "self-insurance" strategies or activities. It is common to differentiate farmers' strategies into three main categories: (1) prevention strategies to reduce the probability of an adverse event occurring; (2) mitigation strategies to reduce the potential impact of an adverse event; and (3) coping strategies to relieve the impact of the risky event once it has occurred (OECD, 2009). Risk prevention and mitigation strategies attempt to address risk *ex ante*; risk coping strategies address risk *ex post*. Mahul and Stutley (2010) differentiate between technical and financial strategies. Technical strategies include, for example, the application of pesticides, vaccination to prevent livestock disease, or crop rotation. Financial strategies comprise precautionary savings, contingent borrowing, or purchase of crop insurance, if available.

Strategies can be based on informal and formal mechanisms. Risk management by farmers is conducted mostly through informal mechanisms, especially among small and marginal farmers who have limited access to formal mechanisms and market instruments such as insurance or hedging.

Over centuries, farmers have developed a myriad of traditional risk management strategies in their respective socio-cultural environments. For example, farmers have developed preservation methods and created storage facilities, household or community-based, in order to cope with price fluctuations and to manage price risks. Farmers in many regions engage in risk sharing arrangements through sharecropping. Contractual arrangements such as forward sale of standing crop are common mechanisms for farmers to reduce price risk.

Traditional forms of precautionary savings are found in almost every agricultural society as a coping strategy, e.g. the handful of rice that is taken aside in a clay pot before preparing the daily meal. Other traditional forms of saving include cattle and other animals, building materials, fire wood, etc. The more important it is that rural financial institutions offer savings facilities, a financial service which was absent in the old paradigm era of agricultural credit.[10]

The risk awareness among farmers is generally high and the significant exposure to production and market risks explains farmers' risk aversion to new technologies, methods, or crops. Risk diversification is an important element in farmers' self-protection strategies. This includes on-farm diversification such as intercropping and crop rotation but also the diversification of income sources to include off-farm and non-farm activities. Survey data from the Consultative Group to Assist the Poor (2005) show that the average share of non-farm household income is considerable: it is highest in Africa (42 percent) and Latin America (40 percent), but also significant in Asia (32 percent). Through multiple income-generating activities small farmers are generally better protected to specific risks in agriculture than highly specialized commercial farmers, especially those engaged in monoculture and single crop cultivation.

The menu of tools and strategies that are available can be different in different countries and for different farmers, for instance due to their size, location, or availability of information, some farmers may have more difficult access to market instruments than other farmers. The farmer chooses among available instruments the combination of tools and strategies that best fits his risk exposure and his level of risk aversion (OECD, 2009) at reasonable cost.

Risk Pooling and Risk Transfer: Market Solutions and Instruments

Risk pooling and risk transfer present solutions to deal with second-layer risks that are more significant and less frequent, and where both frequency and magnitude are in a middle range. In this layer there is scope for farmers to use additional specific market instruments, such as insurance or options that are particularly designed to deal with farming risk.

[10] Vogel (1984) illustratively termed savings as the forgotten half of rural finance.

Traditional Crop Insurance

Agricultural insurance has existed for many years. According to a recent World Bank survey (Mahul and Stutley, 2010),[11] 104 countries – or more than half of all countries worldwide – offered some form of agricultural insurance in 2008. Global agricultural premium volume increased dramatically between 2004 and 2007, rising from US$8 billion to about US$20 billion. This stunning increase was caused by (1) rising agricultural commodity prices and total insured values; (2) expansion of agricultural insurance in China, Brazil, and Eastern Europe; and (3) increasing government subsidy support in major countries. However, agricultural insurance provision is dominated by high-income countries and China.[12] Almost 90 percent of global agricultural insurance premium volume is underwritten in high-income countries.

Crop insurance has been the main product, accounting for an estimated 91 percent by premium volume, while livestock insurance makes up for much of the balance. There have been two traditional lines of crop insurance: multiple peril crop insurance (MPCI) programs and single-peril crop insurance. Most of the MCPI programs depend crucially on government support and subsidies. These programs, which have mostly been implemented in high-income countries, require levels of government support unfeasible for most developing countries (World Bank, 2005). Historically, the traditional crop insurance programs have performed very poorly. Since the 1990s, most developing countries witnessed a shift from public to market-based agricultural insurance and governments have promoted agricultural insurance through the commercial insurance sector, often under public-private partnerships. So far, however, unsubsidized private insurance has mostly been limited to single-peril insurance, e.g. hail insurance (OECD, 2009).

The main difficulty is argued to be the high transaction costs associated with crop insurance markets due to information asymmetries, and the resulting problems of moral hazard and adverse selection. Furthermore, the cost of distribution and administration of insurance services is significant for small-scale contracts with farmers in remote villages. This makes it nearly impossible to provide traditional agricultural insurance for small farmers (World Bank 2005). Premiums that are too expensive reduce or eliminate the demand from farmers at those prices. The demand for insurance is also affected by the relative costs of alternative strategies such as diversification and financial management (OECD, 2009). As an outcome, small and marginal farmers have generally been excluded from the traditional agricultural insurance programs, or insurance programs have never been effective and cost-efficient enough to compete successfully with coping mechanisms employed by the farmer himself.

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[11] The survey covered agricultural insurance programs in 65 countries, covering 52 percent of high-income countries, 69 percent of middle-income countries, and 50 percent of low-income countries that are known to offer some form of agricultural insurance.

[12] In 2008 the agricultural insurance premium volume in China was estimated at $1.75 billion, making it the second largest agricultural insurance market after the United States. (Mahul and Stutley, 2010).

Index-Based Insurance

In recent years, index-based insurance schemes have emerged as an innovative and cost-efficient risk management tool that nurtures the hope of policymakers, donors, and development organizations that marginal and small farmers in developing countries can be provided with better support in managing their exposure to agricultural perils. In such insurance, indemnity payments are based on an index such as cumulative rainfall or aggregate crop yields in a geographical area, and not on the individual farmer's loss incurred.

Unlike in traditional crop insurance products, asymmetric information problems play a much smaller role in index-based insurance schemes. Firstly, a farmer mostly has little more information than the insurer regarding the index value, and secondly the index value cannot be influenced by individual farmers. Finally, administration costs are much lower as it does not require verification of individual loss claims, making it more affordable particularly for small and marginal farmers.

The development of index-based insurance is still at an early stage. Many index initiatives in developing countries have been supported by the donor community and the international reinsurance market. Most of the weather-based crop insurance programs are still under pilot implementation, with only few farmers insured so far. Hence, it is too early to judge their success, except in India where 400,000 farmers purchased weather-based crop insurance in 2008 (Mahul and Stutley, 2010). At present, the pilots face a number of technical and other obstacles such as the lack of high-quality weather data, inadequate distribution of weather stations, limited supply of people with risk-modeling capabilities and expertise in agricultural risk management, and weaknesses in regulatory and legal infrastructure. These problems hamper the pace of progress.[13] Another obstacle for the mechanism is climate change. This is imposing a long-term trend of increasing risk, making the insurance approach more difficult to apply and more expensive (Doran et al., 2009).

A major disadvantage of index-based insurance is the so-called basis risk, i.e. the risk that payouts (triggered by an index) may not correspond with the losses a farmer actually incurs. The basis risk may be substantial, making it difficult for farmers to understand and accept (Skees, 2008). In addition, (re)insurance companies are reluctant to take the reputation risk associated with possible negative media coverage if poor farmers in developing countries are not indemnified for their losses although they bought insurance cover (Levin and Reinhard, 2007). Hence, the central challenge of index-based insurance products is to overcome the problems linked to the basis risk.

Catastrophic Risk and Market Failure: Risk Transfer to Government

Catastrophic events like natural disasters and extreme weather events generate very large and highly correlated losses, even if their frequency is low. This type of

[13] For a more detailed overview of advantages and disadvantages of weather insurance see World Bank 2005, Table 4.1, p.18.

risk is more difficult to pool and transfer through the market mechanism, particularly if it is systemic, affecting entire regions or even countries. Market failure will be the rule. Moreover, climate change has a significant impact on the frequency of catastrophic events worldwide. The data from the United Nations International Strategy for Disaster Reduction show a dramatic increase in the occurrence of natural disasters, particularly of hydro-meteorological events during the last century (OECD, 2009).

It is clear that not all agricultural risks are insurable:[14] insurance contracts for some risks do not exist because the insurance premium covering all the costs would be prohibitive (OECD, 2009). Miranda and Glauber (1997) emphasize the need for risk to be independent among the insured, arguing that due to correlations among individual yields, crop insurers face portfolio risk that is about ten times larger than that faced by private insurers offering more conventional lines of insurance (automobile, fire, etc). And also reinsurers are reluctant to take portfolios with a probability of very large obligations. Natural disasters like the Tsunami in Southeast Asia in 2006, the earthquake in Haiti in 2008, and the recent country-wide flooding in Pakistan in 2010 are examples of catastrophic risk where market instruments break down and which call for the government, supported by the international donor community, to step in with emergency aid, disaster relief, and safety net provision.

Synthesis: Structured Risk Management

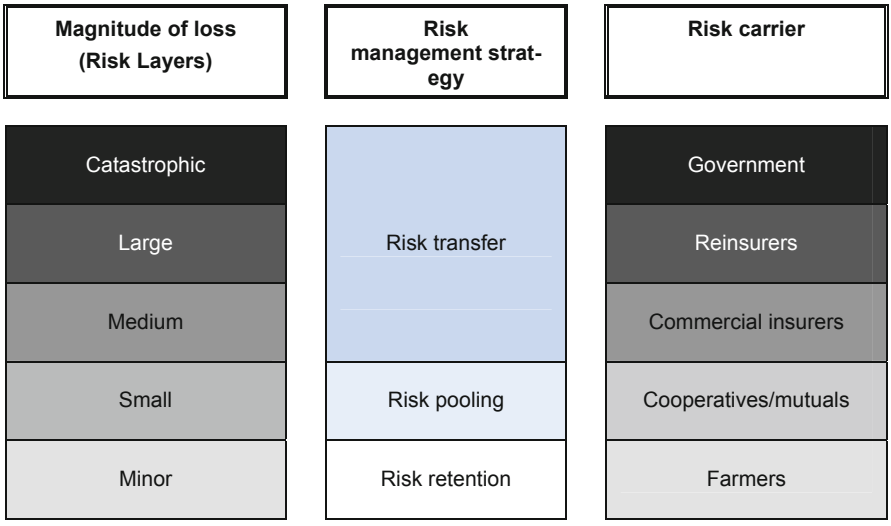

Fig. 1. Structured Risk Management

Source: Own illustration based on Mahul and Stutley (2010)

[14] OECD (2009) lists a number of conditions for the insurability of agricultural risks.

Figure 1 above summarizes the preceding sections in a structured risk management model that integrates the different risk layers and allocates risk-taking functions according to magnitude of losses.

The model above contains two intermediate layers at both the low and high end. At the low end, it introduces risk pooling by cooperatives and mutuals as risk carriers for small losses. This mechanism can, for example, effectively mitigate or even eliminate the basis risk in index-based insurance schemes. At the high end, re-insurance can play an important role in pushing the frontier of commercial insurance toward large and partially systemic risks, thereby increasing the scope of market solutions and confining the role of government to truly catastrophic risk.

Relevance for Financial Institutions

The concept of risk pooling and transfer through insurance is appealing in theory, but reality and thus the benefit for banks is a different story. Traditional crop insurance exists in many countries but it requires large amounts of subsidies and the vast majority of small farmers have no access to it. The promise of index-based insurance is large and expectations are high, but its implementation is still in a pilot stage and its up-scaling potential and sustainability remain untested. Furthermore, climate change is steadily increasing risk, reducing the scope of the insurance approach.

Credit guarantee funds have been promoted to fill this void, often along with technical assistance and training. For example, USAID has been promoting partial guarantee programs through its Development Credit Authority (DCA) in several countries. Skepticism about the impact, additionality, and sustainability of credit guarantee funds go hand-in-hand with (renewed) enthusiasm. There is a new generation of guarantors – e.g. powerful philanthropic foundations, IFIs, etc. – whose contracts with banks have features that could produce outcomes better than those of historic government guarantee funds (Doran et al., 2009). Overall, however, the case for credit guarantees continues to be unclear, as summarized by Meyer (2011): "It is possible that guarantees may provide an additional bit of comfort for financial institutions that are interested in testing the feasibility of lending to a new clientele group. However, it is unlikely that a guarantee alone will induce much additional lending by lenders who do not have such an interest."

Hence, until market-based risk transfer mechanisms become broadly available, financial institutions will have to rely on their conventional risk management techniques such as portfolio diversification and exposure limits. In addition, risk retention by farmers themselves will be a first line of defense. Farmers' prevention, mitigation, and coping strategies are crucially important and banks need to learn more about these "self-protection" tools and take these into account in their overall risk assessment. In addition, risk pooling through groups and cooperatives can be an important complementary feature as the experience of successful agricultural lenders, such as BAAC, shows.

3.3 Political Risks Remain a Challenge

The political risk of government intervention and interference in agricultural finance, whether persistent or unpredictable, is perhaps the risk most difficult to control and to manage by agricultural lenders. In most cases, little can be done to prevent interference or mitigate its negative effect.

BAAC in Thailand, for example, during the 1990s adopted a strategy of "interventions against compensations" through intensive lobbying and policy dialogue with the government officials and members of parliament in order to mitigate or neutralize the intervention effects on the bank's financial viability. On the one hand, these efforts were partially successful but, on the other, they invited even harsher interventions as BAAC's bargaining power diminished. In 1995 the bank was forced to reduce its lending rate for small loans under US$2,400 to loss-making levels, affecting more than a third of its loan portfolio (Maurer, 2000), and in 2001 the government imposed an extensive debt moratorium on farm loans (see above).

The source of funding of agricultural credit can have an influence on government. The case of Bank Rakyat Indonesia in Indonesia has shown that if agricultural lenders are mainly financed by local savings deposits instead of refinance lines from the government, and if they are under prudential regulation and supervision of the central bank they might be subject to interference from government and politicians to a lesser extent.

Amid the recent rise in commodity prices and increasing concerns about food security, government intervention in agricultural markets and agricultural finance will likely remain a considerable – and perhaps even the greatest – source of risk for agricultural lenders.

4 Implications and Perspectives for Agricultural Finance

4.1 Towards a Hybrid Model of Agricultural Microfinance

A hybrid model – or rather models – of agricultural microfinance has been emerging that combines and incorporates lessons learned from traditional agricultural finance, especially from successful agricultural lending institutions, from microfinance, from the financial systems approach in general, and from recent experience with innovative insurance instruments. Christen and Pearce (2005) have presented ten key features of such a hybrid model (see Appendix 1), much in line with the new paradigm of rural finance.

Some of these features are directly related to credit risk and risk management, for example, the principle that repayments are not linked to loan use (feature 1) and the character-based lending technology combined with technical analysis (feature 2). The model suggests to provide savings services (feature 3) that enables precautionary savings as an important coping mechanism for farmers. Portfolio

diversification is a key element (feature 4) and when loan terms and conditions are adjusted to accommodate cyclical cash flows (feature 5) the risk of non-repayment is lowered considerably.

Such hybrid models will expand the frontier of outreach specifically to small farmers in distant rural areas, and will help to manage and mitigate much of the principal and some of the specific credit risks. As such, the models cater to the vast majority of farmers in most countries but they are less applicable to large farms and agricultural enterprises. Moreover, as the models seek to incorporate innovative market instruments such as index-based microinsurance (feature 9) – though still being under development – or contractual arrangements to reduce price risk (feature 6) they offer the potential of controlling and managing also the specific risks of agricultural finance, at least to the extent that such risks are insurable. Certainly, managing catastrophic risk (market failure layer) will remain outside of the scope of such model.

Furthermore, these models serve to reduce the cost of rural and agricultural lending. For example, recently developed models of mobile and branchless banking may provide cost-efficient solutions to reach out to farmers in remote rural areas (feature 7).

4.2 Innovative Insurance Instruments Need Further Study and Development

While initial experience with index-based insurance pilot projects seems to be very promising, further research and monitoring of these initiatives needs to be done to enable conclusions to be drawn about their sustainability, financial viability, and implementation on a larger scale. At the same time, advances in technology, e.g. the use of satellite images, will lead to a better availability of data needed to properly calculate and offer index-based insurance policies (Levin and Reinhard, 2007). While the first pilot projects focus purely on the protection of small farmers affected by negative weather events, index-based insurance products are also attractive to agribusiness intermediaries along the value chain, such as input suppliers, processors and traders whose business operations are correlated with agricultural products. A collaboration with (re-)insurance companies can foster the development of yield-insurance products that are inexpensive, sustainable, and appropriately designed.

4.3 Diversification to Remain a Core Element of Risk Management

Diversification is and will remain one of the primary risk mitigation strategies used by microfinance institutions and rural banks engaged in agricultural lending. For financial institutions, agricultural lending cannot be the primary type of lending unless robust risk transfer techniques become more commonplace, especially for small and marginal farmers. Financial institutions must counter unrealistic ex-

pectations and withstand political pressure to engage non-prudently and excessively in agricultural lending. Under a prudent financial sector approach finance follows the real sector. Hence, the share of value added in agriculture as percent of GDP may serve as a benchmark for financial institutions' exposure to agriculture. According to the World Bank, in 2008 the average share of agriculture was 7 percent in Latin America, about 12 percent in most of East Asia and Sub-Sahara Africa, and 18 percent in South Asia. Hence, setting a ceiling on the share of agricultural loans between 10 percent and 30 percent of a loan portfolio, depending on the region, seems plausible and prudent.

In addition, diversified portfolios of the financial institutions must be complemented by risk diversification by the farmers themselves. Only a small share of the smallholders will grow and emerge as specialized commercial farmers, but the large majority of small farmers will likely remain family or household enterprises. For these, risk mitigation through diversification of income sources will remain a key risk management strategy. Successful agricultural lenders will look more closely at the risk retention layer and analyze the farmer's own risk management capacity in terms of prevention, mitigation, and coping strategies as a factor of creditworthiness. Precautionary savings play a crucial role and thus it is essential that safe, convenient, and accessible savings facilities are offered by financial institutions.

4.4 Improvements in Legal Framework and Financial Infrastructure

In most countries, improvements in the legal and regulatory frameworks are necessary as they pertain to agriculture and agricultural finance. This encompasses systems of clear property rights and especially improved cadastre systems related to land ownership and registry. Another key element is a strong legal framework for secured transactions. Such framework should particularly include a collateral registry for movable assets that would allow farmers to pledge equipment and machinery as collateral as well as facilitate leasing of agricultural equipment. Expanding the collateral options would greatly improve farmers' access to credit, on the one hand, and financial institutions' risk management, on the other hand.

4.5 The Role of Government and Donors

The first and foremost role of government is to refrain from undue interference in agricultural finance by adopting a "do no harm" principle. Admittedly, this is easier said than done. However, politically motivated loan waivers, and other such drastic and damaging interventions, have no place in an environment of responsible finance. Governments around the world should finally move away from the old paradigm of directed lending, interest rate controls, and massive subsidies, and should adopt lessons learned and support good practices that have emerged under the new paradigm of rural and microfinance.

A positive role for the government is seen in creating an enabling environment and legal framework as outlined in the previous section, developing the risk market infrastructure, enforcement of regulations, and a supportive rural infrastructure. This would eventually lead to lower but sustainable interest rates by reducing risks and transaction costs and increasing competition. The primary role of government should be to address market and regulatory imperfections in order to encourage participation by the private sector in providing not only agricultural credit but the whole range of financial services including savings facilities and insurance.

As insurance instruments and other risk transfer mechanisms are being developed and tested, some public support and limited subsidies may be required. However, in the medium to long term the government's role should be confined to catastrophic risk as a result of severe events like natural disasters. This is when the market fails and the government is needed in a last resort function of disaster relief and social safety net provision.

Donors and development finance institutions (DFIs) have an important advocacy role by engaging in a dialogue with governments on conducive policies and frameworks for agricultural finance and by facilitating exchange and learning on lessons and good practices. Donor support is most valuable in venturing and pilot-testing innovative approaches to risk management. The World Bank's lead initiative in developing and promoting index-based insurance in numerous pilot projects is an example in this regard. Furthermore, donors and DFIs can facilitate and catalyze public-private partnerships (PPP), especially for developing mechanisms of risk transfer to the international and global markets. Finally, dealing with catastrophic events like the Tsunami in Southeast Asia or the 2010 country-wide flooding in Pakistan is beyond the scope of national governments and thus require concerted relief efforts of the international donor community.

5 Concluding Remarks

The risk of lending to small famers is not as high, let alone "prohibitive," as frequently claimed by financial institutions. A large – if not overwhelming – part of the risk can be regarded as principal or normal credit risk, which does not much differ from lending to microenterprises in general. These risks can be fairly well managed by applying features of the hybrid model of agricultural microfinance presented above.

More difficult to deal with are the specific risks of agriculture. Crop insurance – publicly provided and highly subsidized – is available in many countries but is not accessible by the vast majority of small farmers. While the concept of risk transfer is appealing and would undoubtedly present a first-best solution, the implementation of market-based insurance schemes is still in a pilot stage.

Until such market-based insurance products become broadly available, agricultural finance will have to rely on second-best solutions. These comprise conventional risk management techniques such as portfolio diversification on the side of

the lenders combined with risk prevention, mitigation, and coping strategies on the side of the borrowers.

Finally, it should be emphasized that agricultural finance comprises – or should comprise – more than just credit. Farm households need money transfer and payment services and, most importantly, savings facilities. Savings have been, and will continue to be, a key feature of successful agricultural finance institutions.

Appendix 1: Segmentation of Agricultural Risks

Level of risk	Micro	Meso	Macro
Affected groups	Individual farm household	Groups of households or communities	Regions or entire country
Degree of correlation	Idiosyncratic risk (independent)	Covariant risk	Systemic or catastrophic risk
Probability of occurrence	Very frequent	Less frequent	Low frequency
Magnitude of losses	Small losses	Significant losses	Very large losses
Incidence and Examples	Regular variation in production: • smaller weather shocks, e.g. hail, frost • non-contagious diseases • Independent events, e.g. fire	Large negative production shocks: • severe weather conditions, e.g. flood • pest infestation	Highly systemic, shocks affecting a large region and leading to catastrophic losses in production: • hurricanes, widespread flooding, drought • epidemic diseases
Risk Layer	Risk retention	Market solutions (Insurance)	Market failure
Risk carrier	Farmers	Private (re-)insurance companies	Government/donors
Risk management strategy	Risk reduction and coping	Risk pooling (insurance) and risk transfer	Risk transfer

Source: Own compilation based on World Bank, 2005; Levin and Reinhard, 2007; OECD 2009

Appendix 2: Features of a Hybrid Model of Agricultural Microfinance

Feature 1: Repayments are not linked to loan use. Lenders assess borrower repayment capacity by looking at all of a household's income sources, not just the income (e.g. crop sales) produced by the investment of the loan proceeds. Borrowers understand that they are obliged to repay whether or not their particular use of the loan is successful. By treating farming households as complex financial units, with a number of income- generating activities and financial strategies for coping with their numerous obligations, agricultural microfinance programs have been able to dramatically increase repayment rates.

Feature 2: Character-based lending techniques are combined with technical criteria in selecting borrowers, setting loan terms, and enforcing repayment. To decrease credit risk, successful agricultural microlenders have developed lending models that combine reliance on character-based mechanisms— such as group guarantees or close follow-up on late payments—with knowledge of crop production techniques and markets for farm goods.

Feature 3: Savings mechanisms are provided. When rural financial institutions have offered deposit accounts to farming households, which helps them to save funds for lean times before harvests, the number of such accounts has quickly exceeded the number of loans.

Feature 4: Portfolio risk is highly diversified. Microfinance institutions that have successfully expanded into agricultural lending have tended to lend to a wide variety of farming households, including clients engaged in more than one crop or livestock activity. In doing so, they have ensured that their loan portfolios and the portfolios of their clients are better protected against agricultural and natural risks beyond their control.

Feature 5: Loan terms and conditions are adjusted to accommodate cyclical cash flows and bulky investments. Cash flows are highly cyclical in farming communities. Successful agricultural microlenders have modified loan terms and conditions to track these cash-flow cycles more closely without abandoning the essential principle that repayment is expected, regardless of the success or failure an any individual productive activity—even that for which the loan was used.

Feature 6: Contractual arrangements reduce price risk, enhance production quality, and help guarantee repayment. When the final quality or quantity of a particular crop is a core concern—for example, for agricultural traders and processors—contractual arrangements that combine technical assistance and provision of specified inputs on credit have worked to the advantage of both the farmer and the market intermediary.

Feature 7: Financial service delivery piggy-backs on existing institutional infrastructure or is extended using technology. Attaching delivery of financial services to infrastructure already in place in rural areas, often for nonfinancial purposes, reduces transaction costs for lenders and borrowers alike, and creates potential for sustainable rural finance even in remote communities. Various technologies show enormous promise for lowering the costs of financial services in rural areas, including automated teller machines (ATMs), point-of-sale (POS) devices linked to "smart cards", and loan officers using personal digital assistants.

Feature 8: Membership-based organizations can facilitate rural access to financial services and be viable in remote areas. Lenders generally face much lower transaction costs when dealing with an association of farmers as opposed to numerous individual, dispersed farmers—if the association can administer loans effectively. Membership-based organizations can also be viable financial service providers themselves.

Feature 9: Area-based index insurance can protect against the risks of agricultural lending. Although government-sponsored agricultural insurance schemes have a poor record, area-based index insurance holds more promise for protecting lenders against the risks involved in agricultural lending.

Feature 10: To succeed, agricultural microfinance must be insulated from political interference. Agricultural microfinance cannot survive in the long term unless it is protected from political interference. Even the best-designed and best-executed programs wither in the face of government moratoriums on loan repayment or other such meddling in well-functioning systems of rural finance.

Source: Christen and Pearce, CGAP 2005

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CHAPTER 8

The Potential of Structured Finance to Foster Agricultural Lending in Developing Countries

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1 Introduction

Three out of every four poor people in developing countries live in rural areas; 2.1 billion of them live on less than two U.S. dollars a day and 880 million on less than one dollar a day. Most of these people depend on agriculture for their livelihoods.[4] One of the major bottlenecks of agricultural development and rural growth is the lack of access to finance, a result of perceived high risks and costs involved in agricultural lending, among other financial services. Banks and other financial institutions in developing countries are still very reluctant to finance agricultural producers and, in particular, small farmers.

As a consequence, for example in various African countries, less than one percent of the available domestic private sector financing typically goes to agriculture, while agriculture accounts for up to 70 percent of the labor force in these countries.[5]

The aim of this chapter is to explore whether structured finance (SF) has the potential to overcome some of the impediments of agricultural lending in developing countries by mitigating specific risks associated with lending to agriculture. Such risk mitigation is possible by sharing, pooling, transferring, and diversifying the various risks.

We start with a broad definition of the term SF, and definitions of agricultural lending and agricultural value chain finance. Then we present typical agricultural risks and risk management strategies including the potential role of SF. Afterwards, we analyse various SF products that foster agricultural lending. The chapter closes with the limitations and important pre-conditions of SF in agriculture in developing countries.

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5 http://www.agra-alliance.org/section/work/finance.

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2 Concept of Structured Finance

SF is not a concise term nor is there a universal definition. Depending on where it is applied, the term covers a wide range of financial market activities and instruments. Typically, SF is understood as a flexible financial engineering tool that can be "employed whenever the requirements of the originator or the owner of an asset, be they concerned with funding liquidity, risk transfer, or other need, cannot be met by an existing off-the-shelf product or instrument. Hence to meet these requirements, existing products and techniques must be engineered into a tailor-made product or process."[6]

Discussion and practice in development finance, for example in the context of providing refinancing to microfinance institutions (MFIs), is primarily focused on securitization and structured funds. Both apply the principle of pooling, diversifying, and tranching assets into different asset classes according to their respective (presumed) risk profile.[7]

In agricultural finance literature, SF is customarily defined broadly: "Structured finance for agriculture and agribusiness is the advance of funds to enterprises to finance inputs, production and the accompanying support operations, using certain types of security that are not normally accepted by banks or investors and which are more dependent on the structure and performance of the transaction, rather than the characteristics (e.g. creditworthiness) of the borrower."[8] Thus, in agricultural finance literature, there is a focus on securities (i.e. collateral) in order to reduce credit risk, rather than on other aspects like risk transfer, liquidity, etc.

As far as the authors' understanding of SF is concerned, the application of SF in whatever form follows one major goal: the financial risk of an investment in a pool of diversified assets (e.g. loans), or the set of different unseparated risks connected with such an investment are decomposed into different types of risks or classes of risk (probability of occurrence). This is done by using special technical and legal tools in order to allow different investors (or risk carriers) to invest precisely in a certain type of risk, which they are best prepared or willing to invest in.

Following this definition, the different forms of SF can be analysed by asking three questions (see Figure 2 below). We will use these questions later as a grid for filtering out suitable SF approaches for agriculture finance.

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6 Fabozzi et al. (2006), p. 1. See also Fender and Mitchell (2005, pp. 69-71) and Fabozzi (2005).

7 For the motives and advantages of securitization as instrument for MFI refinance see for example Glaubitt, et al. (2008), p. 354, or Basu (2005). Risks involved in the securitization process are analyzed in Fender and Mitchell (2005). See also below in this article.

8 Winn et al. (2009), p. 2.

Structuring Process	Outcome
Segmentation of various investment risks	Segmented types of risk
	Defined levels and classes of risk
Allocation and placement of risks	Investment in a specific risk or risk tranche by the most appropriate party based on its • Understanding and assessing of the risks • Capacity to influence probability of occurrence of certain types of risk • Risk carrying capacity

Fig. 1. The Essence of Structured Finance

Core questions for analysing Structured Finance approaches

i. **Information asymmetries:** Which party or investor is most suited for understanding and assessing a certain type of risk?

ii. **Incentives:** Which party or investor is most suitable for influencing the probability of occurrence of a certain risk or the severity of the event?[9]

iii. **Risk carrying capability:** Which party or investor has the financial or organizational means to efficiently and effectively carry a certain risk?

Fig. 2. Analytical Grid of Structured Finance

Since agricultural lending is carrying sector-specific risk and is perceived to carry higher risks than lending to other sectors, the risk segmenting and transferring approach of SF makes it, in principle, appropriate and promising for agricultural lending.

[9] The question of the right incentives cannot be underestimated. As Ananth and Sahasranaman (2011) argue: "Good financial structuring isolates the various risks involved in a project and allocates them to the parties best equipped to handle them. All the fallout from the recent credit crisis has shown, it is critical that any robust financial structure ensures that all parties in a transaction are incentivized appropriately. In a situation where all risks in a transaction are passed on to end investors, asset originators and financial intermediaries have little incentive to perform the requisite due diligence at the time of originating and buying asset portfolios."

3 Risk-Based Differentiation Between Agricultural and Rural Finance

Agricultural finance refers to financial services used throughout the agricultural sector for farming and farm-related activities including input supply, processing, wholesale trade, and marketing. Whereas agricultural finance refers to all kinds of services (including deposit services, money transfers, etc.) for such businesses, discussion in development finance traditionally focuses on agricultural credit, predominantly on credit for primary agricultural production.[10]

Since SF typically targets at credit risks, this article is focusing on agricultural credit, too.[11] But we include the above mentioned agro-related value chain activities under the headline of agricultural credit. Both farming activities and non-farm activities in the agricultural value chain have two relevant features in common and which are reflected in SF and risk-management approaches:

- Both farming and related economic activities in the value chain[12] are often characterised by seasonalities, and
- They are often exposed to the same specific agricultural risks.[13]

In contrast, the concept of rural finance is not defined referring to a business sector, but instead to a geographical definition. It refers to financial services in rural areas that result in a somehow broader category than agricultural finance as it includes financial services to rural businesses that are not directly linked to farming including production and service activities like restaurants, retail shops or manufacturers, as well as financial services to rural households. These customers are not necessarily directly or only indirectly linked to seasonalities and specific risks of agriculture. On the other hand, rural finance does not include urban-based processing facilities or other agri-businesses which are subject to agricultural risk. Thus, from a risk-perspective, the concept of rural finance is fuzzy. However, serving both non-farm and farm clients in rural areas is a way for financial institutions to diversify credit risks and increase scale.[14]

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10 See for instance Meyer (2013), about the historical development of agricultural finance ("the old paradigm").

11 Agricultural credit to farmers is normally provided in cash. But in some structures (involving non-financial intermediaries – see below in the article) in-kind loans are provided for seed, fertilizer, and other farm production inputs.

12 See below.

13 As an example: When detrimental weather conditions reduce the quality and/or quantity of the tomato harvest, not only the tomato farmer is hit in his or her sales income. Also the local factory, which is canning tomatoes, is likely to suffer in terms of sales and income since its input is scarcer and possibly more expensive than usual.

14 See for instance Meyer (2010) or Christen and Pearce (2005).

3.1 Investors' Channels to Finance Agriculture

From the investor perspective, there are three ways of financing agricultural activities.[15] Firstly, direct financing of agricultural producers, for example via agricultural investment funds that target farms directly.[16] Secondly and most obvious, indirect financing through rural financial institutions, and, thirdly, using non-financial intermediaries such as traders or processors as financiers. The involvement of processors or wholesalers in the process of providing finance is particularly common in approaches described as "value chain finance".[17]

3.2 Agricultural Value Chain Finance

Value chain and value chain finance have a range of meanings and connotations, and seem to be an evolving terms. Value chain in agriculture can be defined as a set of actors who conduct a linked sequence of value-adding activities starting from the agricultural producer or produce to processing and to the final consumer or product.

Agricultural value chain finance comprises the financial flows to these different actors from within the chain (internal finance) and from outside institutions (outside finance) as a result of their being a member of the value chain.[18] The importance of value chains in agriculture and its financing mechanisms has grown in many developing and transition countries as a result of globalization and the integration of local and regional markets into global agri-business value chains.

For the small farmer, value chain finance offers a mechanism to obtain financing that may otherwise not be available due to a lack of traditional collateral and high transaction cost of securing a loan.[19] This can be achieved either through members of the value chain, such as suppliers and traders, who are less confronted

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[15] Please note that we focus on formal financial services. Provision of capital by family or money lenders is widely used in rural economies in developing countries, but is not discussed here. Also, internal and self-financing – the financing by the cash-generating capacity of the enterprise or by the entrepreneur him-/herself – are not discussed.

[16] Typically this requires financing volumes of significant size, i.e. investments of smallholders will not be financed directly by outside investors. An example for this approach is the African Agriculture Fund. The minimum investment by the AAF is USD five million. See http://www.phatisa.com/The_Fund_Manager/AAF/.

[17] For value chain finance see the chapter by Swinnen and Maertens (2013) in this volume and in the following chapter of this article.

[18] Compare Miller and Jones (2010), p. 9. Although rarely made explicit in the analysis and discussions of value chain development and value chain finance, authors typically refer to *organized* value chains, i.e. such value chains that are characterized by a specific and defined governance structure, typically arranged and structured via a set of longer-term contracts in order to facilitate the exchange process in the market. Such structure for the exchange of goods along a value chain is somehow the middle alternative in the span between a goods exchange in pure spot markets on the one end, and a vertically integrated firm on the other.

[19] Though empirical evidence on how much small farmers have benefited from agricultural value chains is mixed. See Swinnen and Maertens (2012), in this volume.

with information asymmetries and transaction cost compared to financial institutions (internal finance). Or it can be achieved by outsiders like banks that substitute traditional collateral and screening techniques for the strength and reputation of the strongest partners in the value chain and for predictable cash-flows due to secure markets in organised value chains. Therefore, agricultural value chain finance offers the principal opportunity to reduce cost and risk in agricultural finance, thus increasing access of small farmers to credit.[20]

There are different classifications of value chain finance mechanisms in agriculture ranging from very old and traditional instruments like trader and supplier credit to more complex products such as factoring or warehouse receipt finance. Some authors see a close relation between agricultural value chain finance and SF,[21] and indeed some mechanisms used in agricultural value chain finance apply elements of SF according to our definition above: "The main purpose [of agricultural value chain finance] is sharing risks among various actors, transferring defined risks to those parties that are best equipped to manage them, and as far as possible, reducing costs through direct linkages and payments."[22] Additionally, warehouse receipts – collateral substitutes used in warehouse receipt finance schemes – can be pooled and securitized in future-flow securitizations.[23]

We will describe and assess some of these instruments with elements of SF in the next section.

4 Agricultural Risks and Risk Management Strategies

Financial institutions are typically reluctant to finance agricultural activities, especially small and medium-sized farmers because of their perceived high costs[24] and risks.[25] In order to discuss whether risks issues of agricultural finance can be tack-

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[20] However, successful agricultural value chain finance needs some minimum enabling environment, e.g. quality standards, effective contract enforcement to avoid the common problem of side selling and other forms of contract breaking as well as regulatory and legal provisions in the banking sector to allow traditional collateral substitutes. These framework conditions are not always in place.

[21] For example, Winn, et al. (2009) and Miller and Jones (2010).

[22] Miller and Jones (2010), p. 15.

[23] See Ananth and Sahasranaman (2011), p. 114.

[24] Some case studies suggest that a distribution reaching out to rural credit customers is not necessarily more costly than in urban areas. See Jainzik and Pospielovsky (2013) in this volume.

[25] Actually Meyer (2011) has not found any empirical evidence in the literature which can prove that lending to the agricultural segments is indeed more risky than lending to other sectors. From the authors' experience, it is often misleading to state that banks *assess* risk of farming businesses and lending to agriculture as high risk. Unfortunately, many banks and other financial institutions have no clear understanding about farm economics and markets for agricultural produce and they are lacking appropriate approaches to analyze the related risks so that there is actually no base for a professional

led with help of SF, we will take a look at risks involved in agricultural finance, as well as at the common approaches of financial institutions to handle these risks.

4.1 Classification of Agricultural Risks

Maurer (2013)[26] classifies risks in agricultural lending into three categories: principal credit risks, specific agricultural credit risks and political risks (Figure 3).

Segmentation of Specific Agricultural Risks			
Level of risk	**Micro**	**Meso**	**Macro**
Affected groups	Individual farm household	Groups of households or communities	Regions or entire country
Degree of correlation	Idiosyncratic risk (independent)	Covariant risk	Catastrophic or systemic risk
Probability of occurrence	Very frequent	Less frequent	Low frequency
Magnitude of losses	Small losses	Significant losses	Very large losses
Incidence and Examples	Regular variation in production: • smaller weather shocks, e.g. hail, frost • non-contagious diseases • Independent events, e.g. fire	Large negative production shocks: • severe weather conditions, e.g. flood • pest infestation	Highly systemic, shocks affecting a large region and leading to catastrophic losses in production: • hurricanes, widespread flooding, drought • epidemic diseases
Risk Layer	Risk retention	Market solutions (Insurance)	Market failure
Risk carrier	Farmers	Private (re-)insurance companies	Government/donors
Risk management strategy	Risk reduction and coping	Risk pooling (insurance) and risk transfer	Risk transfer

Fig. 3. Segmentation of specific agricultural risks. Source: Maurer (2013)

credit risk assessment by the banks. Thus, the reference to high risks in agriculture by banks is often only uninformed perception based on prejudices.

[26] Maurer (2013) in this volume; see also OECD (2009).

The **principal credit risks of agricultural lending** (or "normal credit risks") are quite similar to those of micro and small enterprises, and are related to the high degree of informality of the potential borrowers and the lack of traditional loan collateral. These result in severe information asymmetries (particularly regarding the capacity and the willingness of the borrower to repay loans) and, thus, high screening and monitoring cost for the lender typically combined with relatively small loan sizes due to world-wide predominance of smallholder agriculture.

Specific agricultural credit risks comprise production and price risks. Production risks in agriculture stem from the high variability of production output as a result of external factors like weather (temperature, floods, drought, etc.), pests and diseases. Market price risks are more pronounced in agriculture than in other economic activities due to output price uncertainty and volatility in local as well as international markets. Both risk categories exist at different levels and scale, and are often correlated (see Figure 3). Such covariant risks are more difficult to manage since a diversification of these risks does not help to mitigate them – as it is the case with non-covariant risks. That is why they may hit a significant number of loans of a given loan portfolio at the same time. Hence these portfolios need special agricultural risk management strategies.

Additionally, the agricultural sector in developing countries is more prone to **political risk** in the form of political interference than other sectors of the economy because of its strategic importance for food security, employment, and poverty reduction. Politically motivated interventions in the form of sudden impositions of interest rate ceilings and the implementation or only the announcing debt relief are still common and constitute a major risk for agricultural lending institutions.[27] Since frequency of occurrence and severity of that type of risk cannot be assessed and predicted, it cannot be transferred and can hardly be managed.[28] In many countries, it may qualify as the type of risk which is considered so high that it prohibits financial institutions from lending to farmers.

[27] Existing interest rate caps as such (in contrast to their introduction) are not a risk for agricultural lending – interest rate ceilings are "only" preventing lending to smallholders – since costs for doing this lending business cannot be recovered by the banks. As a consequence of interest rate caps, banks steer their credit activities towards medium-sized and large farms. This credit-rationing necessity due to the cap has been found and proven in many studies. Agricultural economist Gonzalez-Vega (1984) has termed it "the Iron Law of Interest-Rate Restrictions". While interest rate interventions might be well-intentioned and socially motivated or rational from the political point of view, in fact they always lead to negative effects with regard to sustainable financing in the agricultural and rural sector. For a synopsis of the effects of government interventions in agriculture lending see Conning and Udry (2007), pp. 2864 et sqq.

[28] See Maurer (2013) in this volume.

4.2 Risk Management Strategies and the Role of Structured Finance

Approaches to **manage the principal credit risk** in agricultural lending can benefit from the experience of microfinance in coping with the challenges of asymmetric information in credit analysis, of client monitoring, and of ensuring good repayment morale. However, two common characteristics of microfinance credit offers may limit service provision in agricultural lending. First, there are the relatively high administrative costs due to assessment and monitoring of clients (i.e. smallholders), which as a consequence require a corresponding level of interest rates for enabling the bank to maintain the business. The second critical feature is the extension of predominantly shorter-term standardized loan products with regular weekly or monthly equal repayments, which is quite common in microfinance. Both features are adequate and useful for trading and service sector activities but might be difficult to be shouldered by certain agricultural producers.[29]

Specific agricultural risks are difficult to manage and constitute the major constraint for financial institutions to lend to agriculture (apart from political risk). As shown in Figure 2, specific risks can be segmented according to level, degree of correlation, probability of occurrence, and the magnitude of losses.

The **independent risk at the farm level** is best assumed by the farmer him/herself, applying measures as risk reduction or prevention, mitigation and coping with the "normal" risk, including measures like crop rotation or application of pesticides. In addition, small farmers reduce risks by income diversification (non-farm income).[30]

In contrast to the independent risks, there is a **group of co-variant risks** that affect larger groups of farmers at the same time (as well as processors and other actors in the value chain dependent on the farmer). These co-variant risks may put

[29] See Maurer (2013). The argument that microcredit is generally not suitable for agricultural activities – because returns on investment are lower for agricultural investments than for investments in urban trading business – is quite common. See for instance Harper (2007), p. 91. Empirical studies, however, suggest that return on investment does differ with the different types of agricultural activity. This is not surprising since it can be generally expected for any economic sector that some investments return more than others, making some entrepreneurs more likely to receive credit financing than others. Return on investment in agriculture as well as non-farm investments of rural households can indeed be substantial. See the different sources named by Meyer (2011), pp. 20-23, and Harper (2007), pp. 87-90. How microfinance banks can be innovative in order to apply less rigid repayment terms is for instance described in Jainzik and Pospielovsky (2013), in this volume.

[30] While the risk management at the "retention layer" is the responsibility of the individual farmer, in particular, risk reduction measures can be supported from outside, e.g. through technical advice or provision of irrigation water. Such support can reduce the credit risk of the lender.

a financial institution's agricultural loan portfolio under pressure because of a synchronised failure of a larger number of credit clients. Examples for such co-variant risks are droughts or veterinary diseases preventing sale of stock, like for instance foot and mouth disease. Thus, well-managed banks only assume such risk to a limited extent.[31] Figure 3 recommends "risk pooling" (insurance) and "risk transfer" as risk management strategies in order to allow financial institutions to build up and manage agricultural portfolios.

Catastrophic risks like natural disasters and extreme weather events, which occur not frequently but create huge and highly correlated damage and losses, are difficult to pool and transfer through market instruments. Thus they create the **typical market failure case and call for government and donor action.**

Structured finance solutions for agriculture, offering risk transfer mechanisms to suitable risk-takers, thus need to be explored in their potential to provide adequate risk transfer for co-variant agro-specific risks. Crop or index-based insurances are very much en vogue in the current discussion, albeit most schemes are still in the pilot-testing stage and potential for up-scaling and sustainability is still quite unclear. In contrast, the potential of segmenting and transferring risk with the methods of structured finance appears to be a less prominent idea.

In the following, we will present and evaluate potentially suitable SF products and give some practical examples in the following section. The examples will also show that in many cases different structured finance products and instruments can be combined to tackle risk and cost issues.

5 Application of Structured Finance in Agricultural Lending

Figure 4 shows some examples of practical arrangements applying the different products of SF.

The examples indicate some preference of donors, DFIs, and IFIs for portfolio guarantees and structured funds. While this might paint a realistic picture of activities in the field of development cooperation, we emphasize that the majority of SF products are used in commercial-value-chain financing arrangements. We estimate that these purely commercial, private sector-based activities are not as present in literature as programmes supported by development agencies.

While in many cases different SF products are combined in order to maximize their risk-mitigation potential, we discuss them first individually.

[31] Christen and Pearce (2005), p. 14, note that successful agricultural lenders typically limit their exposure to the farming sector at between 10 and 25 percent.

SF products	Selected examples of application	Parties involved (Donors, FIs, IFIs, private sector	Remarks
Agricultural (partial) Portfolio Guarantees	Sustainable Agriculture Guarantee Fund (SAGF); IFC – Financiera Compartamos (Mexico); USAID – Standard Chartered Bank / PRIDE (Tanzania); Union Progreso (Mexico); SAID / CAFERWA / Rwanda (coffee); van Oers (Senegal); AGRA / IFAD /Standard Chartered;	Rabobank; IFC; USAID / Development Credit Authority (DCA); Standard Chartered;	
	AgroAfrica Programme	DEG, Standard Chartered	
Structured Funds	Rural Impulse Fund I and Rural Impulse Fund II	BIO, FMO, EIB, IFC, KfW, Incofin and private investors	
Securitization	Drokasa Peru;	IFC	Portfolios of commercial agri-business
	Livestock in Colombia	National Agriculture and Livestock Exchange; Trust as SPV	No agricultural loan portfolio securitization in developing and transition countries could be identified
Receivables-Backed Finance	Cedula Produto Rural in Brazil	Private sector	
Warehouse Receipt Finance	Cedula Produto Rural in Brazil;	Government, Private sector	Relevant for more developed countries and for storable export commodities
	Warehouse Receipts Program Advisory Services (Ethiopia)	IFC	
Contract Farming and Outgrower Schemes	Various projects in rubber and palm oil sector	DEG; private sector (rubber company; palm oil company)	
	Many private-sector driven schemes, e.g. Konzum in Croatia		
Forward Contracting, Futures and Options	AgroAfrica Programme	DEG	Standard Chartered Bank
	MSX Commodity Exchange in India Commercial projects	Private sector	Larger companies world wide

Fig. 4. Examples of Applied Structured Finance products

5.1 Agricultural Portfolio Guarantees

Agricultural portfolio guarantees are usually provided by DFIs and IFIs as vertical partial guarantees with the objective to transfer risks of agricultural lending from the originator of the loan to another party. The authors were not able to identify any program with a second loss guarantee, although this appears much more suitable (see below).

The concept of portfolio guarantees assumes that the guarantee encourages financial institutions to make financing available to agriculture by reducing a lender's perceived level of risk for agricultural loans. The guarantee should lower the lender's potential loss from defaults. In addition, assumed advantages of a portfolio loan guarantee are:

- More favorable loan terms and conditions for the farmer;
- Reduced collateral requirements;
- Longer repayment period for the agricultural loan, which enables borrowers to finance agricultural investments.

Additionally, portfolio guarantees are regarded as an instrument to bring banks closer to agricultural lending so that they gain experience and recognize that agricultural lending might not be as risky as perceived. Therefore, such schemes are typically designed as temporary arrangement, not as permanent structures.

Portfolio guarantees in agricultural finance are a preferred instrument of USAID and are also used by DFIs, as well as IFIs like IFC and AfD.

In principle, the portfolio guarantee reduces the risk of agricultural lenders, thus, potentially increases agricultural lending. The impact on the farmer is access to finance, while there is no direct impact on the farmer's specific agricultural production, market and price risks.

Box 1: USAID Agricultural Portfolio Guarantees

USAID uses credit guarantees from the Development Credit Authority (DCA) to foster lending to the agricultural sector in developing countries. DCA offers four main guarantee products: Loan Portfolio Guarantee, Loan Guarantee, Bond Guarantee, or Portable Guarantee. While each of these mechanisms varies in structure, all retain risk with the private sector, typically the originator of the credit. Only a maximum of 50 percent of the lender's risk are guaranteed.

DCA guarantees are primarily offered in local currency to avoid the issue of foreign exchange rate risk and to redirect local capital to investments in the agricultural sector.

From 1999 until mid-2012, USAID/DCA has mobilized around USD 446 million of credit (maximum cumulated disbursement). It was made available

by financial institutions for the agricultural sector. This was reached by extending 82 guarantees, 79 of them loan portfolio guarantees. These guarantees for agricultural activities accounts for around 26 percent of the total 315 guarantees extended by DCA.[32]

5.2 Are Agricultural Portfolio Guarantees an Appropriate Tool?

Let us apply the three dimensions of assessment grid (see Figure 2) which we developed in the beginning of the article and discuss the handling of information asymmetries,[33] incentives,[34] and risk carrying capacity[35] of loan portfolio guarantee structures.

While donors, DFIs, and IFIs definitely have the capability to carry the risks arising out of the guarantees, partial guarantee schemes carry a major weakness in the lack of segmentation between specific agricultural and principal credit risks. A (partial) portfolio guarantee is like firing pellets with a shotgun instead of using a precision-rifle: It does not filter out and target the risks specific for agricultural lending. Instead, it also covers the principal credit risk – a risk that a financial institution should be able to deal with on its own by applying microfinance best practice (i.e. by adequate underwriting and monitoring techniques). Structured like this, a portfolio guarantee may even set wrong incentives: It reduces the originators financial risk, which is primarily born out of principal credit risk, and as a consequence may contribute to lowering the lender's efforts to overcome information asymmetries by a thorough credit client analysis. Thus, standard partial guarantees do not appear first choice in order to stimulate agro-lending.

Typically, guarantee schemes were meant to help to overcome entry hurdles for financial institutions entering a new market. It is assumed that financial institutions will learn and understand that the newly targeted segment is not as risky as previously perceived. And, thus, the guarantee schemes would not be required furthermore. This hope seems to be largely without grounding.[36]

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[32] Own calculations based on https://explore.data.gov/, dataset for "USAID Development Credit Authority Guarantee Data: Utilization and Claims USAID Development Credit Authority Guarantee Data: Utilization and Claims." For a review of the USAID guarantee schemes see Meyer (2011), pp. 42 et sqq.

[33] The party or investor is most suited for understanding and assessing a certain type of risk.

[34] The party or investor is most suitable for influencing the probability of occurrence of a certain risk or the severity of the event.

[35] The party or investor has the financial or organizational means to efficiently and effectively carry a certain risk.

[36] See Meyer (2011), pp. 33 et sqq. for an overview.

Although an empirical assessment of the usefulness of guarantee schemes for agricultural lending is still lacking, it appears likely that guarantee schemes for agricultural finance will end up with the same shady results as guarantee facilities for lending to SMEs. Several studies in the 1990s analyzing these widely used schemes were cautious about advocating guarantees to stimulate lending or expecting significant impacts from credit guarantee projects. There was no consensus that such schemes widened access to formal bank credits for SMEs, and there was little clear evidence of additionality, i.e. evidence that the guarantee-backed loans would not have been made without such backing.[37]

Agricultural economist Richard L. Meyer has reviewed the extensive literature on guarantee funds: "The case for expecting major impacts from guarantee schemes continues to be unclear. […] It is possible that guarantees may provide an additional bit of comfort for financial institutions that are interested in testing the feasibility of lending to a new client group. It is unlikely, however, that a guarantee alone will induce much additional lending by lenders who do not have such an interest."[38] We would add that traditional partial guarantee schemes do not even help lenders who have this interest: Banks that understand their credit business do not require risk coverage for the principal credit risk (unless for instance they reach portfolio limits and want to grow beyond this limit). They do not pay the fee for a guarantee when the expected costs for write-offs for the bad loans (expected loss) are likely to be lower than the price for the guarantee.

Box 2: AGRA's Innovative Financing Initiative

Recent enthusiasm for agricultural loan guarantees and for its impacts was raised by the Alliance for a Green Revolution in Africa (AGRA), despite the mixed results of guarantee programs of previous decades. As part of its Innovative Financing Initiative it has reportedly extended several guarantees to several benefitting financial institutions (see AGRA Website and Meyer, 2011, p. 34). Since no concrete details are provided on the design of the guarantees schemes, their adequacy and success remain unclear.

Based on these experiences, AGRA had planned to set up a multi-faceted investment fund designed for supporting agricultural development (see AGRA, 2010) termed Impact Investing Fund for African Agriculture. Among the various activities, AGRA planned this fund to provide first-loss arrangements for banks that want to lend to the smallholder agricultural sector (see AGRA, 2010, p. 28). Such first-loss guarantees would be an entirely defect design for tackling the actual risk exposure created through agricultural lending: They are

[37] See Meyer (2011), pp. 33-37. Meyer lists the several studies upon which he based his summary.

[38] Meyer (2011), p. 37.

primarily covering the principal credit risk that a financial institution can perfectly handle on its own. A first-loss barely addresses the specific agricultural credit risks, which a financial institution cannot influence and which is the main brain-racker for banks active in agro-lending. Handing over the first loss to a third party is, additionally, a perfect disincentive for the originator to learn and apply a rigid credit analysis of a farmer borrower, and for monitoring and recovering properly.

5.3 How Innovative Agriculture-Specific Guarantees Could Look

However, the authors belief that portfolio guarantees can make sense if they are designed appropriately to capture the agro-specific risks. What banks are in need of is a more intelligent design that enables them to reduce their exposure to such co-variant specific risk, which they cannot influence. Particularly financial institutions that already have some significant agricultural exposure could greatly benefit, since such risk transfer could enable them to increase their lending which they otherwise would limit due to risk management considerations.

In the following we sketch how such an adapted guarantee scheme could look.

Specific agricultural risks guarantee schemes need to alleviate banks from specific agricultural risks. Thus, they need to be tailored differently from usual partial guarantees. Traditional vertical guarantees cover all credit default risks from principal (or normal) credit risk, over specific agricultural risk to political risks in a fuzzy manner without delivering a differentiation. In contrast to such design, for targeting agricultural risks a horizontal segmentation delivers a segmentation of risk that can filter out agro-specific risk with some accuracy.

A horizontal segmentation or tranching of an agricultural loan portfolio can differentiate the three main sorts of credit default risk in agricultural lending. Techniques for pooling and tranching originated loans are known from securitization operations. For instance, credit defaults of 3 percent or 5 percent of a pool of loans (i.e. what could be considered "normal" default rate due to principal risks) are retained and written-off by the loan-originating bank. This isolates the principal credit risks that can be avoided and reduced by competent financial institutions. Defaults beyond this threshold are then likely to be caused by co-variant risks specific to agriculture. They could then be (partially) guaranteed in order to release the financial institution from this risk category and transfer it to parties that are better equipped and are willing to assume such risk. A third tranche can be included to cover defaults above another threshold like for instance 50 percent. Such losses are likely to be due to catastrophic events. The adequate risk carrier for such catastrophic risk is the state.[39] However, for making horizontal guarantees work, this risk tranche may be retained by the originating bank again: Banks fac-

[39] See Maurer (2012).

ing such exposure may hope to receive some support from their governments, for political reasons, as the state as the only capable risk carrier may be likely to support the risk-taking banks.

Isolating political risk is likely to be a precondition for making the second tranche (the agro-risk specific tranche) interesting for commercially calculating investors. In any case, the risk profile of such a second tranche needs to be carefully analysed in terms of its actual exposure to the different risks as well as the probability and severity of occurrence. Only after such analyses would one know how to design such scheme, which might be suitable for investing parties, and what a sustainable and commercially viable pricing would look like.

Because of its potential to help manage agriculture-specific risks, it appears advisable to investigate the viability of such structures. Tranching a portfolio as described above may be more cost-effective than tackling agro-specific risks by crop or other agricultural insurance.

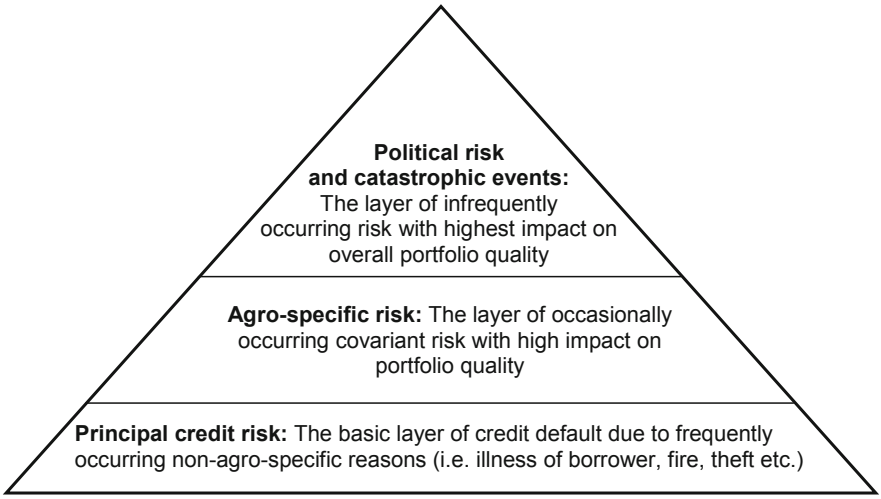

Fig. 5. Horizontal tranching of a portfolio in order to segment different risk types.

5.4 (No) Securitization in Agricultural Finance

Securitization is an operation through that homogenous illiquid financial assets are pooled and transformed into marketable securities.[40] In a securitization transaction, the securitized assets are transferred by the originator (typically a loan-extending financial institution) to a "bankruptcy remote" special purpose vehicle

[40] See for example Basu (2005), Hüttenrauch and Schneider (2008) or Fender and Mitchell (2009).

(SPV) as the asset purchaser.[41] This operation separates the credit risks of the assets from the corporate risk of the originator. The latter is typically the main concern of refinancing parties, i.e. other national or international banks that lend to a financial institution in order to enable it to build up or maintain credit portfolio. A further effect of a securitization can be the removal of the assets from the balance sheet of the financial institution. Such an operation in turn provides them with fresh money for new loans for the benefit of its clients. This may enable a financial institution to maintain a certain level of loan portfolio (for instance to the agricultural sector) without maximizing its exposure, or to maintain a solid capital adequacy for its credit operations.

The pool of assets transferred to the SPV and the resulting cash flows of this pool are arranged and structured in a way that allows the SPV the issuance of securities with different risk levels to investors in order to refinance the purchase of the pool from the originator.

Typically, a first-loss tranche (also called "junior tranche") takes the highest risk, followed by the mezzanine-tranche and the senior-tranche. The first-loss tranche and the mezzanine-tranche provide risk buffer for the senior tranche thus making the latter attractive for more risk-averse private investors. Payments follow the subordination structure ("cascade principle" or "waterfall payment structure"). Consequently, the assets are structured with different levels of seniority reflecting and accommodating the different risk appetite of different investors.

In agricultural finance, securitization could be an instrument that mitigates risks for private investors by creating a granular pool of loans to agricultural borrowers, separating the **credit risk of the agricultural loan portfolio from the corporate risk of the local financial institution, restructuring and tranching the related cash flows and buffering portfolio risks by subordinated tranches**. In principle, such securitization can lead to increased private financing for agriculture and improve refinancing of agricultural lending institutions by transferring most of the specific agricultural and principal credit risk from the financial institution to different type of investors (donors, DFI, private investors). Similar to traditional agricultural portfolio guarantees, there is no direct impact on the specific agricultural risks encountered by the farmer.

So far, securitization has not been widely used in agriculture finance in developing and transition countries.[42] The authors are not aware of any securitization of agricultural loan portfolios. We believe that the reason is the following: First, there is

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[41] Holding the assets in a bankruptcy remote vehicle aims at giving the investors a first ranking right to those assets. The SPV may be a corporation, trust or another type of independent legal entity. The SPV issues securities to the investors, which are backed by the income flows generated by the securitized assets and sometimes also by the underlying assets themselves (true sale).

[42] See Winn et al. (2009), p. 29, and Calvin and Jones (2010), p. 91. Calvin and Jones (2010), p. 91, report one livestock securitization in Colombia through the local agricultural stock exchange (BNA) in the early 2000s.

hardly sufficient statistical data available on the default rates of agricultural loans of local financial institution active in agricultural finance. Second, due to the specific risk of agricultural lending – particularly the co-variant and political risks – there is little appetite of investors to separate just these assets from the lending institution and hence having, risk wise, a direct exposure to the end-borrower.

Instead, investors prefer to benefit from diversification effects within the financial institution's entire portfolio, which mitigates the particular risks of the agro-loans. Additionally, the equity of the financial institutions may be regarded as a reasonable risk buffer, or to put it in other terms, when a financial institution has a significant agricultural exposure it may appear more advisable to take the corporate risk rather than the portfolio risk.[43] Thus, we can see that investors who wish to invest in agriculture go for investments in rural financial institutions (debt or equity), rather than for investments in agricultural portfolios.

5.5 Structured Funds Investing in Rural Finance

Structured funds are investment vehicles, typically for refinancing financial institutions. Structured funds combine flexible fund management by private fund managers with elements of structured finance. They have the general objective to improve access of partner lending institutions to local and international capital markets.[44]

Box 3: Africa Agriculture and Trade Investment Fund

The Africa Agriculture and Trade Investment Fund (AATIF) is a public-private partnership dedicated to increase Africa's agricultural potential for the benefit of the poor. The fund started is operations in 2011.

Its investment instruments include senior debt, mezzanine instruments, and equity. Debt instruments can have a maturity of up to ten years and only in exceptional cases up to 12 years (infrastructure investments); equity (available for direct investments) can be adapted to the various needs of investment phases. The fund can co-invest as part of a consortium and participate through risk sharing with a local bank or an intermediary.

[43] This relates to the finding that diversification will remain one of the core approaches to mitigate risks in agricultural lending. See Maurer (2012).

[44] There is vast literature in particular on structured funds as MFI refinancing vehicle. See for example Glaubitt et al. (2008), Köhn and Jainzik (2005) or Goodman (2008). Well-known structured funds are the European Fund for Southeast Europe (EFSE) and the Rural Impulse Fund II. Miller et al. (2010) provide analysis and some cases studies on agricultural investments funds, but without specifically emphasizing the reasoning behind structured funds.

On its liability side, the fund is structured to allow investments at three different levels (A-, B- and C-shares), each offering a unique risk-return profile with dividends being paid following a cascade principle. It targets public investors (donor agencies, governments and international financial institutions) and professional private (institutional) investors

AATIF is accompanied by donor-funded Technical Assistance Facility of initially six million euros. The facility will provide investment-specific support to partner institutions (e. g. in the fields of best-practices farming techniques, agricultural risk management, or support of certification processes). It will also promote compliance with the fund's social and environmental safeguard guidelines and development policy, and shall facilitate impact assessments.

In its first 1.5 years of operation, AATIF concluded two direct investments in agribusiness: USD 10 million have been invested in Chobe Agrivision Company, a Zambian farm operator with a strong focus on improving local and regional food security with the production of wheat and soy in irrigation areas. A USD five million loan was negotiated with the Global Agri-Development Company (GADCO), a Ghanaian rice producer. Additionally, AATIF concluded two investments with financial institutions: PTA Bank received a USD 30 million facility. PTA is a multilateral financial institution, owned by eighteen East-African member states, the People's Republic of China, and the African Development Bank. The funding will be used to expand PTA's agricultural lending. Chase Bank (Kenya) Ltd, a privately owned Kenyan financial group, received funding under a five year senior loan facility of USD ten million. The loan is earmarked to support Chase Bank's roll-out of its agribusiness sector strategy.

In 2012, investors in the fund were the German government, KfW, and Deutsche Bank. The latter is also the investment manager of AATIF.[45]

The main characteristic of structured funds is to pool and tranche diversified assets (mostly loans to financial institutions) into different classes. The asset side of structured funds may be quite homogeneous (for instance exclusively debt investments). The structuring takes place at the liability-side: Payments to the fund originated from its assets follow the subordination structure ("cascade principle" or "waterfall payment structure"). The capital is structured with different levels of seniority reflecting the different risk appetite of the different investors, typically corresponding to distinct risk-return profiles. Similar to securitizations, the junior or equity tranche are often invested in by the asset originator, i.e. the fund manager in this case (who can influence the risk through thorough screening and other measures), and by donors or DFIs (that have the risk-bearing capacity and willingness).[46]

[45] See www.aatif.lu.

[46] Compare Figure 2.

Structured funds offer a broad range of financial products and instruments that allow their structures to be demand driven and quickly adaptable to changing market conditions. By applying structured finance elements they can attract private capital even for relatively risky countries or entities. This thus leverages limited donor funds and complements investments of DFIs and IFIs. Structured funds are established as legal entity and managed by professional private fund managers. They are governed by a board of directors or similar bodies according to the respective legal domicile chosen by the investors in the fund. Like securitizations, structured funds can provide attractive conditions for private investments by risk mitigation through diversification at the regional, country, and financial institution level, as well as through adequate tranching.

Thus, since diversification on the asset side is a core element of risk management of structured funds, investments of these funds target rural finance and do not concentrate on agricultural finance. In other words, they try to avoid investments in financial institutions that are excessively prone to specific agricultural risks. Rather, they invest in rural financial institutions that have a diversified portfolio themselves, i.e. in financial institutions that do not only invest in primary agriculture and processing but also in other rural businesses that are not directly linked to farming and its specific risks.

Box 4: Rural Impulse Fund I (RIF I)

Rural Impulse Fund I (RIF I) was set-up in 2007 as a global, closed-end fund licensed as specialized investment fund under Luxemburg law. The fund has a planned lifetime of ten years and carries an investment volume of USD 38 million. RIF I offers debt, equity, and guarantee investments for commercially viable rural MFIs with the objective to improve access of smallholders and rural micro and small enterprises to credit and other financial services. This strengthens the rural MFI's financial structure and improves its rural outreach, impact, and sustainability.

The fund's capital is structured with different levels of seniority reflecting the different risk appetites of the investors. The equity amounts to USD nine million, which is provided by DFIs and private investors at an equal share. The mezzanine tranche of USD ten million is provided by DFIs only. Senior debt of USD 19 million is provided by seven private institutional investors.

The fund is managed by Incofin and investors are BIO, FMO, EIB, IFC, KCB Private Equity, Incofin and others, including private institutional investors.

As of 12/2010 almost USD 31 million have been invested (mainly in debt) in 24 rural MFIs across 18 countries worldwide with a customer base of around 1.5 million clients. About 50 percent of the MFIs have invested 25 percent or more of their portfolio to borrowers active in agriculture, while about 25 percent

of the participating MFIs lend more than 50 percent of their loan portfolio to the agricultural sector.[47]

Because of RIF I's economic and developmental success, a second fund **RIF II** was promoted by Incofin and launched in 2010. RIF II has a size of EUR 120 million and adopts a similar business model to the predecessor fund and includes both private and public investors.[48]

6 Finance Structures in Value Chain Finance

As highlighted above, a joint characteristic of approaches in Agricultural Value Chain Finance (apart from tackling the issue of distribution costs of financial services) is that they intend to transfer defined risks to those parties in the chain that are best equipped to manage them. We will now e explore central approaches of value chain finance and discuss their designs from this risk-transfer perspective.

6.1 Receivables-Backed Finance

Receivable financing,[49] typically discussed as one approach in Agricultural Value Chain Finance, is a method to convert produce sales on credit terms into immediate cash flows thus providing the farmer with flexible working capital. The credit is determined by the financial strengths of the buyer of the agricultural produce and not the farmer or seller of the receivables. For the financial institution the address risk (in terms of moral hazard) is shifted from the farmer to the buyer.[50]

Although often tailor-made, the financing is in principle structured as follows: The lending bank advances funds to a farmer for working capital (sometimes also investment finance). As security, the bank is given an assignment of future receivables from the designated buyer of the agricultural produce. This assignment is acknowledged by the buyer who will make payments according to the schedule in his delivery contract with the producer. All payments will go to the bank (collection and debt service accounts) in line with the repayment obligations of the farmer. Any payments for the farmer beyond his debt service to the bank will be remitted back to the producer.

Receivables-backed financing is applied in agriculture using for example the contractual obligations between producer and buyer as a substitute for the bank's

47 See www.incofin.be/static/en/what_we_do/for_investors/rural_impulse.aspx.

48 See www.incofin.be/static/en/what_we_do/for_investors/rural-impulse-2.aspx.

49 Receivables-backed finance includes instruments such as trade receivable finance, supplier finance, factoring and forfaiting. See Winn et al. (2009), p. 7, and Miller and Jones (2010), p. 56.

50 See Winn et al. (2009), p.18.

assessment of the creditworthiness of the farmer borrower. **Risks are spread between the different parties with the buyer of the agricultural produce being the most important factor.** The buyer screens the reliability of the borrower, whom he probably knows from earlier transactions, so that the information asymmetry between buyer and farmer is smaller than between bank and farmer. Through the screening of the farmers, and support to them (for instance through agricultural extension), the buyer also has the opportunity and incentive to reduce the payment risk which he may have assumed towards the bank. The specific agricultural risk typically remains with the farmer as the agricultural produce have to be sold by the farmer first.

So far, receivables-backed SF is applied in agriculture mainly in international trade finance for export receivables (mainly to developed countries) because of the good credit standing of the buyer but to a much lesser extent in domestic finance.[51] A well-known example is the Ghana Cocoa Board (COCOBOD) that since 1992 signs international syndicated receivables-backed pre-export finance facilities. COCOBOD raises this short-term finance to support cocoa purchases from local growers during the crop season and sells them afterwards internationally.[52]

Box 5: Receivables-Backed Finance

Starbucks Coffee Company works with coffee-growers' associations and is aware of the importance of pre-financing the farmers' harvest and the local processing and preparation for export. To receive short-term loans from financial institutions the farmers associations can use their Starbucks sale contracts as reliable collateral. When the coffee is shipped, Starbucks pays the financial institution directly for interest and principal payments.[53]

6.2 Warehouse Receipts Finance

In warehouse receipt finance, a financier provides credit to a seller and relies on goods in an independently controlled warehouse to secure the credit. The warehouse operator issues warehouse receipts, in one form or another (depending on a

[51] See examples of the different forms of receivables-backed finance in Miller and Jones (2010), pp. 67 et seqq. and Winn et al. (2009), pp. 17 et seqq. Winn reports a successful programme in Brazil using domestic agricultural receivables in the form of Rural Product Notes and combined with warehouse-receipt finance.

[52] For the 2011/2012 season, COCOBOD has raised 2 billion USD via this facility which was oversubscribed by over 20 international and Ghanaian banks. KfW Ipex Bank was among the investors. See www.ghana.gov.gh: "Ghana Cocoa Board Signs USD 2 Billion for 2011/2012 Cocoa Purchase."

[53] See Miller and Jones (2010), p. 65.

country's legal and regulatory system), which then form the basis of financing since these receipts function as artificially created collateral. Rather than relying on the producers' (or exporters') promise that the goods exist and that the proceeds of their sale will be used to reimburse the credit provider, the goods are put under the control of an independent warehouse operator. However, the credit provider still needs to ensure himself that the goods have not been pledged previously. Proceeds of sales are then used for repayment of credits. Warehouse receipts are negotiable and facilitate the conversion of illiquid farm produce into cash since they allow the farmer to make use of previously non-existing bankable collateral.

The use of warehouse receipts as collateral provides the additional advantage that the commodities are no longer in the possession of the borrower, and hence if the borrower defaults the lender has easy recourse to the commodities. Banks or trading companies normally accept advancing funds against commodities that are being stored in reliable warehouses and have been assigned to the bank or trading company through warehouse receipts. **For the financial institution the credit risk is not in the farmer anymore but instead in the successful sale of the stored agricultural produce.** Consequently, the financier assumes some specific agricultural risks since the value of the collateral depends on the current market prices.

In principle, warehouse receipts are a strong form of security that can be combined with other structured finance instruments. It can be used for durable goods that can be stored and must be standardized by type, grade, and quality, e.g. cotton or grains. However, its use is restricted to post-harvest financing and cannot solve the working capital problems of small farmers.

While simple in concept, a warehouse-receipt system requires in practice the availability of safe warehouses and widely accepted commodity grades and standards. It needs a well-functioning and transparent warehouse management system and is largely limited to non-perishable goods with relatively predictable price developments (or forward markets). In addition, the system depends on additional legal and regulatory pre-conditions, e.g. the (regulatory) recognition of the receipt as legal document to be used as credit collateral and on fairly developed commodity markets to ensure the tradability and liquidity of the receipts. Due to these requirements and pre-conditions, the warehouse-receipt instrument is feasible in agricultural finance only in more advanced developing and transition countries.[54]

In addition, there is a lack of detailed and careful empirical assessments to conclude whether the receipt system has improved access to finance, in particular for small farmers. The fact that warehousing is common for export crops suggests that economic barriers may constrain expansion into grains and other commodities produced primarily for local markets.[55]

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[54] Calvin and Jones (2010) and Miller et al. (2009) quote examples from India, the Philippines and Brazil.

[55] Meyer (2011b), p. 44.

In terms of suitable risk transfer, this form of structure does not allow for a transfer of all specific agricultural risks: Production risk remains with the farmer. The price risk becomes partly transferred to the financier since the value of the collateralised agricultural goods is subject to price risk. Maybe the up-to-now limited success of warehouse receipt finance also relates to unwillingness by the banks to take collateral with usually volatile values.

6.3 Forward Contracts, Futures and Options

A forward contract is a non-standardized contract between two parties to buy or sell an agricultural product at a specified future date at a price agreed today.[56] Forward contracts can be tailor-made to fit specific requirements of the underlying agricultural commodity, and they are often embedded in different forms of value chain finance (see above). As they are privately negotiated and not exchange-traded, they do not depend on well-established commodity exchanges. From the farmer's perspective, forward contracts have the advantage of protecting against price drops. This establishes a floor in the expected revenue (successful production given), which can facilitate access to finance.

Futures are agreements with highly standardized and closely specified contract terms obliging the involved parties to buy or sell a certain quantity of agricultural produce at a fixed price at a future date. They are traded on future exchange markets.

Options are risk management instruments that do not lock in prices but give protection against unfavorable price movements with the possibility of profiting from favorable ones. They trade on exchanges as well as on the over-the-counter market offered by banks or traders. They are hedging instruments and do not involve the trade and exchange of agricultural products. Both futures and options are not used that often used for the benefit smallholder agricultural finance. Typically, volumes are too low here and product qualities vary too much. However, a pooling of producers, for instance via farmer cooperatives, or in organised value chains, is in principle a way to make options available for smallholders and to overcome the issue of small ticket sizes. But such arrangements would need to be set up and developed by the supply side (i.e. exchanges, traders) and brought to the market by them since small-scale farmers in developing would rather not group together for the purposes of acquiring options.

Overall, forward contracts, futures, and options provide the farmer hedging against price volatilities but have no impact on the agricultural production risk.

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[56] See Miller and Jones (2010), p. 85 and Winn (2009), p. 61. Miller and Jones (2010), pp. 86-87 report a successful programme in Brazil using forward contracting in the form of "rural financial notes" (cedula produto rural).

6.4 Contract Farming

Contract farming is not a SF product as such, but in contract farming often different SF elements are used in order to address agricultural and non-agricultural risks. Contract farming is usually defined as an outsourced production contract (supply contract), e.g. between a pool or a group of agricultural producers and a central processing facility, wholesaler or international retailer. The arrangement, also called outgrower scheme, often involves the advancement of inputs, funds and technical assistance from the off-taker and an obligation to deliver and take a specific quantity of agricultural produce at harvest time, at a specific price (product buy-back clause).[57] The financing of working or investment capital (often needed to allow the farmers for producing the required quantities and qualities) is provided by the agribusiness firm, the wholesaler/international retailer or by a financial institution. In many cases contract farming involves a lead firm that provides farmers with inputs, finance, technical assistance, and market access, and ensures quality and timely product delivery.[58]

Contract farming reduces the agricultural production risk for the farmer through technical assistance as well as secured and adequate input provision. This follows more a risk-prevention, rather than a risk-transfer approach. The forward contracting, which is often involved in such schemes, also reduces the marketing and price risks, both for producers and buyers. For the agricultural lender it may shift the credit risk from the farmer to the buyer of the produce, when guaranteed sales agreements can be used as collateral.

A major problem in contract farming for the agribusiness firm is side-selling: In case of increased prices for the produce, the farmers may sell to other buyers. Inversely from the perspective of the farmer, purchase commitments may be broken by agribusinesses when market prices are decreasing with the formerly agreed price in the scheme resulting much higher than current prices at the time of harvest. Thus, the address risk (in terms of moral hazard) to be taken into account by a financing institution is influenced by the contractual structure. In general, in financing contract farming structures the address risk is transferred from the farmer towards the off-taker. Thus, the risk the financiers have in their books moves from a diversified portfolio of smallholder farmers as credit clients to one or a low number of bigger corporate clients. From a risk perspective, a highly granular portfolio of comparatively (potentially) high individual default risk is exchanged with a big risk concentration with (potentially) lower default probability. Thus, it is not clear if this risk transfer will actually result positive or negative.

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[57] See UNCTAD (2002), p. 10, and Winn et al. (2009), p. 7.

[58] The Starbucks example also applies the lead firm approach.

7 Summary

Figure 6 summarizes the analysis of the different SF products and shows which of the various agricultural lending risks are mitigated by the respective SF products. The figure also explains why in practice, especially in agricultural value chain finance arrangements, very often different SF products are combined in order to increase risk mitigation effects.

Risks	**Specific agricultural credit risk (farmer)**		**Principal credit risk** (lender and investor)	**Political risk** (farmer and lender/investor)
	Production risk	**Price risk**		
Agricultural portfolio guarantees	Partially carried by guarantor	Partially carried by guarantor	Partially carried by guarantor	
Securitization			Mitigated via risk-buffering and diversification	Mitigated via sector and country diversification
Structured Funds			Mitigated via risk-buffering and diversification	Mitigated via sector and country diversification
Receivables - backed finance			Risk shift from farmer to buyer	
Warehouse receipt finance		Collateral value of receipts subject to price risk	Risk shift from farmer to sale of stored produce	
Forward Contracts, Futures and Options		Hedging against price volatility		
Contract farming	Risk is mitigated via TA and supply of farming inputs	If combined with forward contract, there is price risk mitigation	Address risk is influenced by contractual structure	

Fig. 6. Transfer and mitigation of agricultural lending risks (simplified)

8 Concluding Remarks

There are no simple solutions for creating sustainable agricultural credit systems, and SF is certainly an instrument with potentials but also limitations. We find a quantitatively relevant application of SF instruments in agriculture so far concentrated on value chain finance approaches. In particular, these approaches show practical relevance when they include agro-processing and focus on high-value cash crops with already existing export markets and reliable export contracts.

However, one can state that other SF approaches are also in principle suitable to foster agricultural lending, if applied appropriately and considering its specific strengths and weaknesses in terms of risk-transfer abilities. Effects at the small-farmers level through improved access to credit at better terms, reduction of market and price risk and lowered production risk may be reached.

Direct reach of small farmers still remains a challenge because scale of operations remains important when applying SF approaches. The set-up of SF arrangements (e.g. securitization) is costly, complex and time-consuming and involves inter alia valuation, quality assurance, security assessment, legal analyses, and a lot of related paper work.

We assume that there are some factors that will contribute to an increased use of SF in agriculture:

- Commercially oriented agricultural sectors with competitive advantages in high-value cash crops will continue to make use of risk-transfer possibilities within organised value chains;
- Fairly well-developed commodity exchanges and future markets – also in developing economies – will allow for increased use of such instruments and for inclusion of such instruments in SF approaches, particularly value-chain related ones;
- The current increase of agricultural finance by at least some professional private banks in developing countries will increase the demand for SF instruments, in order to allow such institutions to better manage their risk on a portfolio level by transferring some of the risks to third parties willing to carry it.

However, important preconditions or bottlenecks for increased use of SF products remain. According to our understanding, these are particularly the following:

- Adequate basic rural infrastructure, e.g. transportation, communication and storage facilities such as warehouses (for warehouse-receipt finance);
- Standards and certification of agricultural products by type, size, and quality;
- Legal and regulatory system that ensures the enforcement of contracts;
- Banking regulations that recognize warehouse-receipts as legal documents.

Also, **policy issues** remain. Improving the framework conditions according to the bullet points above (most of them with public good character) is a task for governments. But there are also some specific interventions that may be suitable to overcome bottlenecks for the initial use of SF approaches in order to pave the way for a broader use of these instruments, and for a use without continuous involvement of the public sector. Both national governments and donors or other public investors may play an important role by:

- Providing technical assistance to promote and upgrade banks and to cover the up-front costs of agricultural SF transactions;
- Covering (temporarily maybe) the most risky part of agricultural SF transactions.[59]

Development finance institutions, both national and international ones, can be an important facilitator of adequate use of SF in agricultural finance. Such DFIs have detailed knowledge of the financial sectors in the respective developing and transition countries and its legal and regulatory environment on one hand, and they have a reputation in the commercial world on the other. They have different banking products in place, and they understand banking risks. From this position they can perform the following functions in agricultural SF transactions as a complement to government efforts:

- they take an active role in structuring risks as the lead or structuring investor by becoming involved in agricultural SF transaction at its inception; and
- because of their developmental orientation they can take higher risks compared to commercial investors, taking the mezzanine tranches, while offering senior tranches to more risk-sensitive investors.

Moreover, DFIs are well positioned to act as "honest brokers" with regulators to overcome legal and/or regulatory hurdles, permitting the introduction of agricultural SF products to a new market or asset class in developing and transition countries.

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[59] See Hartig (2011).

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CHAPTER 9

New Approaches to Agricultural Insurance in Developing Economies

Joachim Herbold[1]

Providing appropriate risk management tools for agriculture is a key challenge for agricultural development. Agricultural insurance systems play a vital role in that process: they provide structured cover against natural perils and legal entitlement for indemnification for the farming sector. As such, they serve as collateral for agricultural loans and provide a safety net for investments. Agricultural insurance systems have been successfully implemented in recent decades, though mostly in industrialized countries. All of these systems are based on public-private partnerships; only these have proved to be successful and sustainable, whereas purely private or purely state-organized systems have failed. This article illustrates why agricultural insurance systems based on public-private partnership will also lead development in developing countries and emerging markets, and elaborates upon the key components of such systems.

World agriculture is facing the challenge to provide sufficient high-quality food, raw materials, and energy to a growing world population. According to the United Nations' Food and Agriculture Organization (FAO), there is a need to increase agricultural production (food, feed, renewable primary products) globally by 1.6 percent annually until 2015 and thereafter by 1.4 percent until 2030.[2] Greater investment in agriculture will be necessary to meet this challenge.[3] Though high agricultural commodity prices are helping to finance these investments, financial institutions will also have to make a significant contribution by providing finance and risk transfer solutions.

Agriculture is confronted with a series of risks: political risks, market risks, contamination risks,[4] and natural risks.[5] No other economic activity has as large an

[1] Senior Underwriter Agriculture, Munich Reinsurance Company.

[2] See BMELV (2008).

[3] The FAO report "How to Feed the World in 2050" for instance states that total average annual net investments in developing countries would have to amount to US$83 billion in order to achieve the required increase of 70 percent in food production by 2050 (FAO, 2009).

[4] Contamination due to biogenic factors (e.g. mycotoxins in cereals), chemical residues/ substances or radioactivity.

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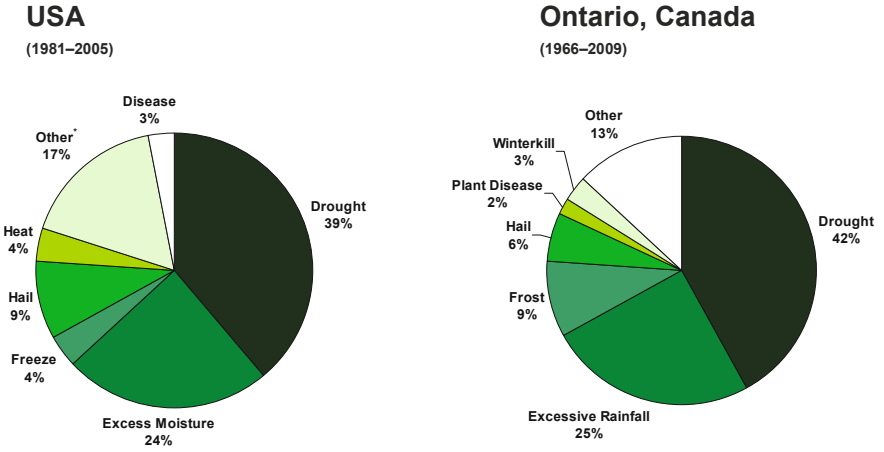
exposure to natural risks as agriculture. This is due to production being in the open air, its high dependence on sufficient and timely water supplies, and its susceptibility to pests and diseases. With appropriate management practices[6] risks can be reduced, but not eliminated.

Losses due to extreme weather events are therefore a common phenomenon, especially in crop and grassland production. The majority of these losses – estimated at 70 to 80 percent – are attributable either to lack of rain or excess of moisture (either rain or flooding). The rest is mainly due to frost, hail, and windstorm. Accurate data on crop losses caused by adverse climatic conditions are limited to countries with crop insurance systems established for decades, such as the United States or Canada (see figure 1).



* "Other" includes but is not limited to: cold wet weather, frost, wind, flood, cold winter, insects, hurricane, hot wind, irrigation failure, aflatoxin, wildlife, erosion and fire.

Fig. 1. Losses per peril in the MPCI programmes in the USA and Ontario, Canada
Sources: Rain and Hail, 2011; Agricorp, 2011

According to the projections of climate scientists, climate change can increase the variability of weather patterns in many regions; and increase the frequency and severity of extreme climate events. This implies increased frequency of heat stress, droughts, and flooding in particular, as well as modified risk of fires, and pest and pathogen outbreaks. The negative effects will be more pronounced in

5 Natural risks are climatic (e.g. drought, excessive rain, flood, hail, frost, winterkill, windstorm) and biological (e.g. diseases and pests) risks.

6 E.g. site and variety selection, crop rotation, soil preparation, fertilization, pest and disease management, sanitary measures.

low-latitude countries than in the rest of the world.[7] This puts farmers in such countries that rely heavily on the agricultural sector particularly at risk of suffering additional losses.

Smallholder farmers in developing countries are particularly vulnerable. This is due to various factors:

- Production often in more exposed areas, e.g. disadvantaged and mountain regions, marginal land;
- Shortage or lack of financial means to invest in risk-reducing measures, e.g. irrigation, drainage, frost prevention;
- Limited access to loans;
- Limited access to inputs to improve production techniques, which might have risk-reducing effects.

The livestock sector is more exposed to epizootic diseases than to climatic risks. There is a high risk of epizootic disease outbreaks being spread over a wide area and consequently causing high economic losses. Prominent examples of such outbreaks are foot and mouth disease (FMD) in the United Kingdom in 2001[8] and in South Korea in 2010–2011,[9] as well as avian influenza in Asia since 2003.[10] Though such large loss events have relatively long recurrence periods, the loss potential is huge.

In many developing economies,[11] farmers retain the risk of crop losses and epizootic diseases irrespective of the size of their farms. Their risk management mainly consists of diversifying their income sources by planting a variety of crops and breeding cattle. They have hardly any risk-transfer tools, which in turn limits the availability and range of agricultural production finance offered by banks. This situation has not changed with the development of microfinance and microinsurance[12] over the last decade. Thus, neither microfinance nor micro-insurance have made their way into the area of agricultural production. Although

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7 For more information on this topic and the impact of climate change on agriculture refer to IPCC 2007. See also IAASTD, 2009; FAO, 2009.

8 One of the worst FMD outbreaks worldwide. Animals culled: 6 million (4.9 million sheep, 0.7 million cattle, 0.4 million pigs); losses to agriculture and the food chain: €3.6 billion; government compensation for slaughtered animals and payments for disposal and clean-up costs: €2.9 billion (DEFRA, 2004).

9 The worst ever FMD outbreak in South Korea. As of 24 March 2011, 3.3 million pigs and more than 150,000 cattle had been culled (Asiaone Health, 2011).

10 These outbreaks were caused by viruses of the H5N1 subtype. As of June 2007, 62 countries around the world had reported H5N1 in birds. During these H5N1 outbreaks more than 250 million birds were destroyed or died and the direct economic costs for affected countries exceeded €8.8 billion (WHO, FAO, both undated).

11 Developing economies comprise emerging markets and developing countries.

12 Microfinance/microinsurance is defined as finance/insurance designed for low-income people/businesses not served by typical social or commercial insurance schemes.

this is not surprising, many people are unaware of the fact because rural microfinance/insurance is normally aimed at rural households and not crop or livestock production specifically. Therefore, the development of sustainable risk management systems and tools – one of them being agricultural insurance – will be a key topic in future agricultural development strategies as well as in climate change mitigation strategies.

1 Ex-ante Versus Ex-post Risk Management Solutions

After major agricultural losses in a country, it is common practice to try to release funds to farmers in the form of disaster payments. These payments are made either by the national government or by international organizations like the World Food Program (WFP). The shortcomings of these ex-post payments are:

- Inaccurate distribution of the money, thus either over- or under-compensating the real loss;
- Long process to release and distribute funds, as a result of which the relief often comes late, so that farmers might miss the following crop season and, if worse comes to worst, lose their assets;
- Not accepted as collateral by lending institutions such as rural banks;

Ex-post payments are subject to political considerations. Often they are not driven by impartial criteria but are heavily dependent on external circumstances such as the timing of an election or political and international factors.

Due to these shortcomings, many governments, farmers' associations, financial institutions, and international organizations are nowadays reviewing their risk management approach, looking for ex-ante rather than ex-post risk management solutions in agriculture. These ex-ante solutions consist of:

- Agricultural insurance systems:
  They have the advantage that the farmer has a legal entitlement to indemnification in cases clearly defined in the policy wording. Furthermore, payments are made quickly, improving liquidity in times of financial difficulty. Structural and operational aspects of these systems will be discussed in detail in the following sections.
- Fund solutions:
  - State-run funds
    Nowadays state-run funds are found mainly in the livestock sector to cover the value of the stock in the event of government slaughter orders. In former times these funds were set up also to cover crop losses due to extraordinary climatic conditions, e.g. in France, Greece, Israel.

      Participation in these funds is obligatory. They are normally financed at least partly by the farmers through levies, either by a surcharge on agricultural sales or by a levy per head in the case of livestock. The

remainder is financed by the state, either by annual co-financing or in case of an event by subsequent payment where an event has occurred.[13]

In the livestock sector these funds are a very important and successful tool to cover the value of livestock in the event of epidemic diseases. Epidemic diseases are mainly controlled by government slaughter order on the affected and the surrounding farms.[14]

However in the crop sector, state funds have proved ill-suited due to difficulty in assessing the real crop losses, leading to either over- or under-indemnification. Another major problem has been late payment and depletion of funds after big loss events. As a result, fund solutions are often replaced by crop insurance systems.

- Privately run funds:
  These are set up to cover specific production sectors against selected perils, often in form of mutuals. Participation is optional. Typical examples are the Potatopol and Avipol in the Netherlands.[15]

- Combination of insurance and fund solutions:
  In the livestock sector, where fund solutions play a vital role in managing losses caused by epidemic diseases, the base cover provided by the fund should be enhanced by insurance cover for natural perils. In more developed economies, where a national epizootic disease control system and legislation is in place, business interruption covers can also be integrated. These covers indemnify if in the course of an epidemic disease outbreak a farm lies in a quarantine zone established by public authorities for a protracted period.[16]

In the case of crop insurance, a combination of insurance and fund solutions might be considered for the starting phase, especially where there is a high degree of uncertainty as to insurable risks and lack of data are a real constraint. Natural risks for which sufficient data or loss experience is available are classified as insurable and are covered by the insurance system. All other risks will be covered by a state fund. There has to be a strong link between insurance cover and fund cover: only

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[13] See Gabber, 2007, for a detailed comparison of the national compensation systems for epizootic diseases in the European Union.

[14] Public authorities in the European Union for instance might order culling within a radius of three kilometer around the outbreak (quarantine zone) and a surveillance zone of, for example, 10 or 20 km radius in which for a certain period of time no livestock and no livestock products (e.g. milk) can be moved. The size of the surveillance zone depends on the characteristics of the epizootic disease.

[15] Potatopol covers only the diseases ringrot, brownrot, and Potato spindle tuber viroid (PSTVd) in potatoes. For more information see Potatopol, 2011.
Avipol covers only the diseases salmonellae, mycoplasma gallisepticum (MG) and "schrikziekte" in poultry production. For more information see Avipol, 2011.

[16] Normally defined as a certain number of days after establishing the quarantine zone (see also table 1).

policyholders and participants in the crop insurance system are entitled to indemnification for non-insurable risks under the fund cover. The fund could be financed, for example, by an additional premium for participation in the fund cover claimed under the insurance scheme.[17] In the course of the development of the insurance system, more and more risks are covered by insurance and the fund can be dissolved gradually.

Drivers of ex-ante risk management solutions are often governments or governmental institutions that wish to avoid a supplementary budget in the event of disaster payments and see a structured risk management approach as an important component of their agricultural development strategies. However, the farming sector too – depending on the extent to which it is organized – might be a driver or at least a strong supporter as it is confronted with limited access to agricultural finance because without risk transfer solutions they often cannot provide the security required for loans. This is the reason for financial institutions, and in particular agricultural and rural banks, often being strong advocates of agricultural insurance systems.

In the insurance industry, the drivers are often specialized agricultural insurance companies and reinsurers with a strategic agricultural focus – but only if certain structural requirements are achievable.[6] Multiline insurance companies – though having a potential commercial interest – can sometimes be indifferent or reluctant, as their traditional business model in non-agricultural lines differs considerably from the business models needed in agricultural insurance.[18] Furthermore, not many insurance companies have a rural strategic focus and a network in rural areas.

2 First Considerations When Setting Up Agricultural Insurance: System Approach Before Product Approach

In the discussion on agricultural insurance in developing economies it is misleading to look for the solution first at product level. With an insurance product alone – either an index insurance product or an indemnity-based insurance product – the problem of lacking access to appropriate risk management tools in agriculture cannot be solved. This is why all the proposals for index insurance over the last few years have not solved the problem of a lack of risk management tools in developing economies. This is not necessarily due to the type of product, but to the failure to implement the appropriate framework that any insurance product needs. In other words, a system approach has to be pursued first, before determining which insurance product is appropriate. Such a system approach creates a suitable legal, institutional, and organizational framework in which insurance products and other risk management tools can function efficiently.

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[17] Portugal, for instance, has adopted this.

[18] See section “SystemAgro: Framework and Structural Aspects of Agricultural Insurance Systems”.

A successful and sustainable agricultural insurance system consists of three major components:

- Framework and structural aspects;
- Operational aspects;
- Innovation.

Only if these three elements are all present and implemented as effectively as possible will the system achieve a high acceptance level among the stakeholders, financial stability, and sustainability.

3 SystemAgro: Framework and Structural Aspects of Agricultural Insurance Systems

The framework and the structural aspects of sustainable agricultural insurance systems have been compiled systematically by Munich Re under the name of SystemAgro.[19] The key features and key success factors are:

- Ability to respond to the heterogenic structures in the agricultural production sector (e.g. large-scale, medium-sized and smallholder farms as well as different production sectors) and provide individual insurance solutions to each of them. Sustainable production methods and use of best-available production techniques are prerequisites of insurance. Cooperation with extension services might be beneficial;
- Agricultural insurance systems to be organized and financed as public-private partnerships between the state, farmers, and the insurance industry.[20] The role of these stakeholders is as follows:
    - State: legal and regulatory framework, definition of agricultural insurance as a part of national agricultural policy, agricultural insurance law, co-

[19] For more information: www.munichre.com/systemagro.

[20] Traditionally, agricultural insurance was organized either privately by insurance companies without state involvement or by the state alone. State-run systems were very common in the socialist countries (e.g. Soviet Union, China, Mongolia, German Democratic Republic) until 1990, often organized as obligatory insurance (Wildermuth, 1998). By contrast, privately organized systems prevailed in nations with a market economy. However, until 1980 even the United States had a state run agricultural insurance system that was subsequently reformed into a public-private partnership system. As either purely privately or purely state-run systems have proved to be ill-suited if comprehensive multi-peril insurance is required in these cases, public-private partnership models are at the forefront of developments. Privately organized insurance is prevailing only in those countries in which single peril insurance, e.g. hail insurance, predominates.

financing of the risk premium and administrative costs, risk carrier for catastrophe losses, supervision of the system. To guarantee the long-term stability of the system, cross-party agreement on these elements is essential. Premium subsidies and state reinsurance for catastrophe losses contribute to keeping insurance terms affordable for the farmer, thus facilitating high market penetration and the stability of the programmed;

In developing countries, where state institutions sometimes have insufficient resources, some of these tasks might be assumed by international organizations. At the national level, the ministry of agriculture and the treasury generally intervene;

- Farmers: financing part of the risk transfer by paying an insurance premium, retaining part of the risk in the form of a deductible or with index products as a basis risk. Applying site-specific and sustainable production methods and techniques in order to minimize production risks;
- Insurance/reinsurance industry: risk carrier, marketing and administration of insurance policies, portfolio management and product development, loss adjustment. Especially in developing economies, where direct insurance companies are often short of risk capital, reinsurance arrangements are essential to maintain the solvency margins of insurance companies at an adequate level. Besides the much-needed risk capital, reinsurers operating globally also contribute expertise and international experience in setting up and managing agricultural insurance systems.

- Joint market approach by all insurance providers and risk carriers, e.g. in form of a coinsurance pool. In such a pool, all of the crop risks of one country or even several (smaller) countries are combined, thus creating a better spread of risk. This joint market approach includes market-wide uniform insurance terms and conditions that are technically sound and – if appropriate historical data is available – actuarially calculated. These uniform terms and conditions are approved by the state and then have to be applied by all insurance providers. This is an important factor in guaranteeing the sustainability of the system;
- Centralized technical entity run by the insurance industry, which bundles the technical expertise, maintains an extensive database, and carries out the loss adjustment;[21]
- Integrate financial institutions as well as agricultural input, output, and extension service providers (including cooperatives) in order to promote and market the insurance products cost-effectively.[22]

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[21] See section on "Operational Aspects of Agricultural Insurance Systems: Loss Management and Loss adjustment/administration."

[22] See section on "Operational Aspects of Agricultural Insurance Systems – Distribution".

4 Operational Aspects of Agricultural Insurance Systems

If the above-mentioned framework of an agricultural insurance system has been put in place, then a wide range of operational aspects has to be addressed. As mentioned above these tasks are best carried out by a centralized technical entity. This is also the best approach to combining the expertise and experience available nationally. Nevertheless, especially in developing countries, such qualified staff are often scarce, making this one of the most critical and limiting factors, especially in the start-up phase. To alleviate these limitations, it is advisable to establish international cooperation agreements with countries that have established agricultural insurance systems or with Managing General Agencies (MGAs) that operate the systems.

5 Insurance Products and the Overestimated Potential of Weather Trigger Policies

Agricultural insurance systems require a range of appropriate insurance products to cover the various production sectors (e.g. crop, grassland, livestock) and crop types prevailing nationally. It is important for products to be customized to the development stage of the national agricultural sector and to the structural differences (e.g. large, medium-sized and small farms and their differences in revenue). Different products with their underlying concepts are described in Table 1. If several risks are covered, it is important that they be insured as a package; this means that individual risks cannot be chosen by the insured. Each product described has advantages and disadvantages. Therefore, insurance products have to be selected taking into consideration the risk and production characteristics prevailing in a country and the needs of the farmers and the banking sector.

Despite this, in the last few years the discussion on crop insurance in developing economies has been focused on index insurance based on meteorological triggers (weather trigger policies). These insurance products were promoted as *the* solution. Many international organizations and non-governmental institutions promoting microinsurance have adopted this position. The fact that an insurance product alone cannot be the solution[23] and also that the insurance product had considerable shortcomings was overlooked:

- These policies pay out if a specific meteorological value, e.g. precipitation, is not achieved or is exceeded in a specific period of time – irrespective of the actual yield. The problem is that there is a relatively low correlation (as low as 60 percent) between the trigger and the actually harvested yield. This leaves a considerable basis risk with the individual farmer for the specific risk.

[23] See section "First Considerations When Setting up Agricultural Insurance: System Approach Before Product Approach."

Another reason for basis risk is the fact that the product covers only one or – at best – two natural hazards.

The above-mentioned basis risk has resulted in situations where the farmers have suffered considerable crop losses without the policy indemnifying – a situation that is disastrous both for the farmer and for the insurance industry because of the loss of confidence and acceptance among farmers and state representatives.

- There are stringent requirements for the infrastructure. Weather stations have to cover the entire geographical area, be closely meshed, and tamper proof. These requirements are often not met, which decreases the accuracy and increases the basis risk.
- These policies are difficult for the clients to understand, especially smallholder farmers, because the real mechanism of the cover is difficult to follow. Thus smallholder farmers are normally not acquainted with, for instance, how many millimeters of rainfall they would need for a decent crop.
- Consequently, demand by farmers for meteorological trigger policies has generally been much lower than anticipated by the promoters.

This does not mean that these products might not play a role in risk transfer for the agricultural sector. However, except for grassland, where index products have proved to be successful at farm level,[24] the potential for covers based on meteorological triggers is more at aggregate level than at individual-farmer level. Instead of covering the individual farmer, the cover should apply at aggregate level, for example covering a crop credit portfolio or the portfolio of a cooperative. Under these circumstances, the basis risk can be absorbed by the aggregating body. The problem of how to distribute indemnification in the event of losses to the individual lenders or cooperative members still has to be solved, for example by providing them with individual covers. In any case, aggregate covers should address this problem and define clear procedures and obligations to indemnify the individuals.

For covers at farm level in the special circumstances of developing economies, area yield index insurance, for instance, might be an attractive solution. It is also suitable for smallholder farmers. A prerequisite is that the production potentials at the different locations in the region be homogeneous because a certain percentage (e.g. 70 percent or 80 percent) of a regional average yield of a specified crop (mainly annual crops, such as cereals) is covered independently of the individual yield on the farm. If the actual regional yield is below the covered yield, an indemnification is paid out according to the shortfall (difference between actual and covered yield). Traditionally the actual regional yield was the yield recorded by the public authorities after the harvest. The period for collecting this data is rela-

[24] For more information on insurance products offered in Canada and the United States see AFSC, 2011 and RMA, 2011.

tively long, resulting in considerable delays for payouts. The following alternatives might be feasible in the near future:

- Assessing the yield on random sampled plots out of a universal set of insured plots in the defined region;
- Remote-sensing technology (cf. section on "Innovation")

In the case of developed production systems and conditions and for medium-sized and large farms, the following insurance products should be considered:

- Yield guarantee insurance to cover annual crops such as cereals and oleiferous and root crops. There are two alternative ways of setting the guarantee level: a percentage (normally around 70 percent) either of a regional average yield or of an individual production history at the insured's location. The period under consideration should be five to ten years. In order to avoid anti-selection all plots cultivated with the same crop have to be insured.

Damage-based insurance products, especially for specialty crops such as vine grapes, fruit, and vegetables. As the drought exposure of these crops is normally limited, covers with only selected perils[25] are feasible. Fruit and vegetables produced for developed national or international markets require not only quantity cover but also quality cover.

6 Portfolio Management and Underwriting

Portfolio management and underwriting are key elements for the operation of agricultural insurance systems. Staff with a high level of expertise and experience are required. Experience and knowledge are of utmost importance, as reliable historical data are scarce, making decisions based on uncertain criteria more the rule than the exception.

In the start-up phase of an agricultural insurance system, special attention should be paid to building up a balanced portfolio spread over different production regions, production sectors, and crop types. It is advisable is to start with the major crops in the most important production regions and leave specialty crops and areas that are difficult to access for a later development stage.

International organizations and NGOs, however, often use another approach: pilot projects focusing on selected crops in specific regions. This is understandable from the perspective of the donors as these pilot projects can be launched with a limited budget and financed for a specific period only. However, scaling up these pilot

[25] E.g. fire, hail, frost. However, if several perils are insured, then only as a package, not selectively. Also all plots cultivated with the same crop have to be insured.

projects to programs at national level covering major crops in all important production regions have often failed. Generally speaking, this approach is not advisable.

Underwriting agricultural risks is a challenge, mainly due to the lack of reliable historic and exposure data, and previous experience with agricultural insurance. Rates – for indemnity-based or yield guarantee products normally calculated with historical loss data – often cannot be calculated on a actuarial basis, so that they then have to be derived from exposure data or from exposure comparison with similar regions in other countries or with other crops. The uncertainty involved, however, is considerable and can best be managed by having a sizeable and diversified portfolio.

It is of utmost importance to take into account the advances made in weather forecasting and meteorology in general in the underwriting of agricultural risks. There are two aspects:

- In recent years, weather forecasts have improved considerably and the periods for which reliable forecasts are available have increased and will continue to do so. In order to prevent selective buying of insurance, the underwriting has to be adjusted, for example by extending waiting periods[26] for risks such as frost, excessive rain, and flood, and by bringing forward sales closing dates;[27]
- **E**l **N**iño/**S**outhern **O**scillation (ENSO) research has made significant progress in the last decade, leading to statistical correlations between the ENSO phase and regional impacts.[28] Due to these correlations and improved seasonal climate forecasts, some climate patterns can be predicted with some confidence for certain geographical areas.[29]

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[26] The waiting period is the period between policy inception and the date cover begins.

[27] Sales closing dates are the dates after which insurance cover is no longer available. Sales closing dates are essential for all policies covering drought.

[28] The most commonly used index is the Southern Oscillation Index (SOI); others are the NOAA‘s Oceanic Niño Index (ONI) of and the Japan Meteorological Agency index (JMA).

[29] El Niño-phase, December to February:

- Australia: below-normal rainfall across much of the country, in particular the northern, the west and the north east. Increased risk of drought;
- South America: above-normal precipitation in Ecuador and parts of Peru, with increased risk of excessive rain and flooding; below-normal rainfall in large areas of Colombia, northern Brazil, and Chile;
- Africa: below-normal rainfall probabilities in large parts of southern Africa.

La Niña-phase, December to February:

As a consequence, the likelihood of demand for insurance being influenced by the relevant forecasts is increasing considerably. In order to avoid anti-selection and to guarantee a balanced portfolio over time for the insurers, multi-year direct insurance arrangements will gain in importance in countries where ENSO-related impacts are strong.

7 Distribution

Cost-effective distribution of agricultural insurance products is a challenge due to the spread of clients over a large geographical area and hence the problems in accessing them cost-effectively. This situation is aggravated if insured assets have a relatively low value, as for instance in the case of smallholding farmers. This challenge is independent of the insurance products offered.

In industrialized countries, distribution is dominated by direct insurance brokers and agents. In developing economies, such distribution is often too costly and therefore other distribution channels prevail. The most important channels are currently rural and agricultural banks, which have good regional distribution networks and established links to farmers through their credit business. It obviously makes sense also to use these structures for agricultural insurance purposes, either by offering agricultural finance and insurance as a package as the preferred option or on an option combining it, for example, with reduced interest rates as an incentive.

However, other possible distribution channels have also unexploited potential, particularly input and output marketing services (e.g. elevators or storehouse, agricultural traders), extension services, cooperatives, and microfinance institutions. There are synergies that should be used in order to provide cost-effective delivery of agricultural insurance to different target groups.

As agricultural insurance is service intensive, it is questionable whether alternative distribution approaches, for example via Internet and mobile phone networks, will be successful.[30]

- Australia: above normal rainfall across much of the country, most notably in eastern and northern regions. Increased risk of damage from heavy precipitation and flash floods. Reduced risk of drought;
- South America: dryer-than-normal weather conditions in western central Argentina and in eastern Brazil. Risk of drought is increased in those regions. Above-normal rainfall in South America's regions north of the Equator, but also in Patagonia and southern Chile. Hence the risk of flooding and landslides is increased;
- Africa: above-normal rainfall probabilities in large parts of southern Africa. Increased risk of flooding.

(Faust, 2011).

[30] These technologies however could be used for premium collection or claims payments (see section "Administration and Data Management").

8 Loss Management and Loss Adjustment

Quality insurance requires the timely payout of claims in order to guarantee liquidity for the farmers. To achieve this, efficient loss management processes have to be in place.

Furthermore, in most cases a loss adjustment network is necessary. This is essential for all insurance products requiring an in-field loss assessment (see Table 1) or – in the case of livestock insurance – a loss verification. Only certain index products, for example those based on meteorological triggers, can function without them, though qualified personnel available at regional level is also necessary for the maintenance and supervision of weather stations.

The backbone of a high-quality loss adjustment network is the personnel who have to have specific agronomic, loss assessment, and insurance expertise.[31] It is common practice to have specialist loss adjusters for certain crops and even insured perils. In order to work in a consistent and verifiable manner, loss adjusters need meticulously designed adjustment methodologies and procedures.[32] In case of direct loss insurance best practice is for these methodologies to be derived from crop-specific, scientific field experiments with simulated damage to the crop. Loss adjustment is cost-intensive. Modern technology and future advances will however contribute to lower costs and lead to new applications and processes.[33]

9 Administration and Data Management

Appropriate IT systems are the backbone of an efficient administration comprising inter alia policy issue, premium collection, loss payments, data management, and interface with regional branch offices and governmental entities. These systems have been developed in several countries in the last decade, taking into consideration the specific requirements of agricultural insurance and national characteristics. It might be more cost-effective to use them under licensing agreements than to develop them from scratch again. In any case, it is of the utmost importance that the system used has a properly designed database that permits the collection and storage of all-important underwriting and loss data. Over time, such a database develops into an invaluable asset, which enables product development, underwriting, and rate calculations to be performed on a technically sound basis.

In order to reduce administration work, it would be beneficial to use official data from governmental institutions on individual farmers and their crop growing areas and production.

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[31] This service is normally provided by freelance professionals on a fee basis. Regional coordinators of the network managing the in-field adjusters work either freelance or on contract.

[32] For an example of such guidelines, see MAPA.

[33] See section “Innovation: The Driving Force in all Development Phases”.

10 Innovation: The Driving Force in All Development Phases

Successful agricultural insurance systems are subject to constant change, especially in the operational area. Though the structural components, once established, are relatively stable, they also need to be adapted or refined from time to time.

Agricultural insurance systems develop over years and decades from:

- Selected production sectors to all important sectors;
- Selected risks via all climatic risks to all climatic and natural risks;
- Non-individualized insurance products (e.g. index products) to individualized insurance products;
- Dominant crop types, mainly grain and oleiferous crops, via all crops with quantity cover to all crops, including specialty crops with quality covers.

Innovation is essential in order to enhance agricultural insurance systems, adapt them continuously to the needs of a changing farming sector and increase efficiency. Underwriting, product development, and loss adjustment are particular target areas for innovation.

Technology plays an important role in innovation. Key technologies leading future development will be:

- Georeference and Geographical Information Systems (GIS):
  Collecting georeferenced data of insured plots and processing them with GIS will be essential in future for underwriting, loss adjustment, accumulation control, portfolio management, rate calculation and the application of remote-sensing technology;
- Remote-sensing technology:[34]
  Nowadays remote-sensing technology for agricultural applications is developing rapidly: plot identification, yield estimations, and assessment of loss events and vegetation status are only examples of activities that will enhance crop insurance and other risk management tools.

  A key factor will be to identify correctly the crop type and then to determine yields accurately with remote-sensing technology. It can be assumed that this will be achieved first and in the near future with cereals, oleiferous; and tuber crops for regional yields; this technology can then be used to determine the actual regional yield for area-yield products. In a next step, reliable yield determination on individual plots might be possible.

[34] Remote-sensing uses aerial sensor technology to detect and classify objects on the Earth. It records information from the ultraviolet, visible, infrared, and microwave regions of the electromagnetic spectrum with equipment such as cameras, scanners, lasers, and linear arrays. This equipment is located on aircraft or spacecraft (e.g. satellites). Visual and digital image procession is used to analyze the information obtained. (ISU).

If that is the case, then individual yield-based covers will also be feasible for smallholding farming.

Furthermore, insurance products using remotely-sensed vegetation indices will further gain in importance, especially for covering extensive farming such as grassland.

Remote-sensing technology will also play a major role in assessing large loss events,[35] supporting loss adjustment coordination and activities as well as national or international food and disaster aid.

- Automatic yield-recording
  Combines and harvesters equipped with automatic yield recording combined with GIS are already a widespread technology in many parts of the world. For insurance applications, it is essential for the yields and the corresponding georeferenced plots to be recorded in a tamper-proof and fraud-resistant manner. Only then can they be used as reliable yield declarations by insureds. Further improvements in automatic yield-recording technology and reliable data transfer will enhance the application of this technology to yield guarantee products and will contribute to improving the accuracy of yield determination and to reducing loss adjustment expenses.[36]

11 Current Status and Outlook

Agricultural insurance systems have been developed over the last decade in several emerging economies. It is estimated that in 2010 emerging economies contributed €2,500 million, or 20 percent, to the estimated worldwide agricultural insurance premium pool of some €12,500 million.[37] The vast majority of the premiums, an estimated 93 percent, are allocated to crop insurance. Key features of selected systems in place are described in Table 2, all of them organized in the framework of public-private partnerships. These systems are nowadays an important risk management tool for farmers. However, market penetration is still unsatisfactory and further attempts to increase it, for example by product development and structural improvements, need to be made. This process will be enhanced by new and more accurate technology.

It is to be expected that additional countries will follow these examples and develop their own agricultural insurance systems adapted to the specific characteris-

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[35] For instance, inundations can be monitored relatively accurately by means of radar remote sensing; yield losses can be estimated by monitoring the duration of the inundation in specific areas.

[36] This technology will benefit primarily large and medium-sized farms that harvest mechanically. However, it is also used by contract harvesters who also harvest on smaller farms.

[37] 48 percent of this figure is attributable to crop insurance in the United States.

tics and needs of their agricultural sector. Their endeavors will benefit from the experience gained worldwide in the last few decades in setting up and managing agricultural insurance systems, leading to their being developed more rapidly and cost-effectively in the future.

Exchange Rates

€ 1 corresponds to 1.3687 US$, 2.2806 BRL, 0.85434 GBP, 61.9428 INR, 16.5109 Mex Peso, 9.0098 RMB.

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PART IV:

Using Modern Technology for High-Quality Services in Rural Areas

CHAPTER 10

Reaching the Client in Geographically Adverse Conditions: Can Outsourcing Increase Effectiveness and Efficiency?

Christine Westercamp[1]

1 Introduction

Serving rural financial markets in developing and transition economies requires understanding the specific needs of the rural population in terms of financial products and services, designing adapted products and services on this basis, and defining an adequate organizational set-up.

The specific constraints of the agricultural and rural market induce high costs and risks. In this context, one of the main challenges is setting up adapted and cost-reducing processes, as well as organizational structures. The main issue in this chapter is: How can a financial institution organize the delivery of its services to the agricultural and rural market in a sustainable way?

To answer that question, we will review the specific constraints and costs of providing financial services to remote rural areas, and then discuss how branchless banking can help increase outreach and reduce costs, before concluding on policy recommendations.

2 Providing Financial Services to Remote Rural Areas: Specific Constraints and Costs

2.1 What Are the Constraints Faced in Remote Rural Areas?

Rural areas in developing countries are not homogeneous. But nevertheless they share a certain number of common challenges in the operating environment impacting the costs, the organizational set-up, and relationship of financial service providers and their clients.[2] Those constraints can be linked to the environment in which a bank operates or to its clients' characteristics.

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[1] Senior Consultant, Horus – Development Finance.

[2] In this paper, the word "bank" is used in a broad sense, to refer to financial institutions offering microfinance services, whatever their regulatory status, thus including microfinance institutions.

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Constraints linked to the environment are the following:

- Low population density usually results in higher distances between a bank's branch and its clients, thus increasing transportation costs and time spent in transport, both for the bank's officers and the clients themselves, and offering little opportunities for economies of scale;
- Additionally, poor road infrastructure very often makes access to markets difficult and increases both transportation costs and time spent in transport, for clients, branch staff, as well as head-office staff for supervision and audit missions;
- Lack of access to basic utilities results in higher costs for the bank to run a branch (necessity of a generator, fuel supply, office supplies) and difficulty for the clients to provide copies of documents, photographs, etc. This can potentially be offset by lower costs for renting branch premises;
- Poor communication infrastructure (telephone, internet access) makes it both more complicated to reach clients and more difficult and costly to communicate and update data in the MIS,[3] resulting in increased risk of fraud and error;
- Cash management is more costly and dangerous, as cash needs to be transported over longer distances, thus reducing frequency and entailing higher levels of liquidity necessary as compared to the level of activity;
- Difficulty of appointing and keeping educated staff in remote places entails higher training and supervision costs;
- When quality of portfolio deteriorates, enforcement costs may be higher in rural areas than in cities with faraway courts and police; moreover, in problematic cases, powerful elders may support customers instead of bank.

Constraints linked to clients' profiles:

- Often lower revenues in rural businesses, linked to typically smaller turnover and size, compared to urban enterprises, lead to lower loan amounts. Typically lower household income and wealth levels lead to lower deposit size per saver. This leads to negative impacts on the net income generated per money unit lent and, respectively, on the cost incurred per money unit deposited;
- Lower use of cash in the rural economy leads to less demand for financial services;

[3] "Management information system" is the financial institution's internal management or "back-office" system.

- Both agriculture and other rural economic activities targeting farmers are seasonal, which makes the banks' cash management more complicated and requires them to adapt loan repayment schedules. The latter may require expensive customization of IT systems;
- Lower financial literacy increases the need to train clients and explain how each product and service works. This needs to be taken into account when designing products and processes;
- In some regions, a bad debt culture has arisen due to failures under the old agricultural credit paradigm.

However some characteristics of rural markets can also be favorable and encourage financial institutions to work there:

- Competition on the financial market is often low, which decreases direct marketing costs and reduces the risks of multiple loans;
- Rural households are usually tied to their land, hence much less mobile than urban households, making borrower monitoring and supervision easier and more reliable;
- In many rural areas, loan repayment discipline is better than in urban areas due to higher social control, reducing the time spent by MFIs in contract enforcement.

2.2 What Is the Impact of Rural Finance on Cost Structures?

In the present analysis, the different categories of costs are defined as follows: Production costs are incurred for (and during) the transformation process of the product or the provision of the service. Transaction costs are costs related to using the market for exchange processes (mostly costs of information, establishment of contract and contract enforcement).[4] Transaction costs are incurred both by vendors and buyers whereas production costs are incurred exclusively by vendors. Specific production and transaction costs incurred for financial services delivery are represented in the diagram in Fig. 1.

A bank might be interested in developing its activities in rural areas in order to spread out its central fixed costs (management, IT, etc.) over a broader base. An analysis of marginal costs and benefits of rural activity can thus be a driver to extension to rural areas.

[4] See Erin Andersen, "The Salesperson as Outside Agent or Employee : a Transaction Cost Analysis", Marketing Science, Vol. 4, No. 3, Summer 1985; and Douglass North, *Institutions, Institutional Change and Economic Performance,* Cambridge University Press, 1990/1999.

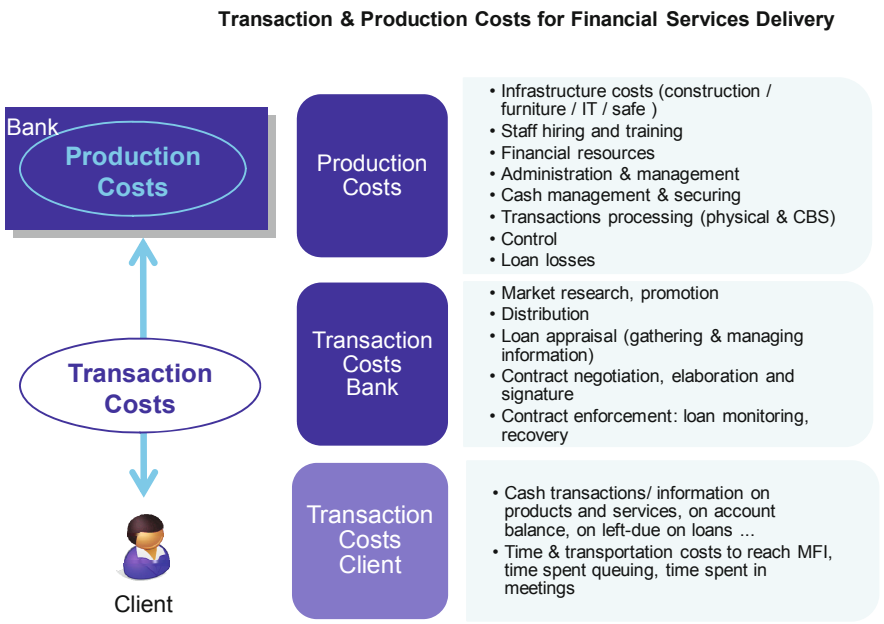

Fig. 1. Transaction and Production Costs for Financial Services Delivery

The central issue in rural finance is the difficulty of reaching clients (the market), without incurring too high costs, both at bank and at client levels. The organizational constraints a bank faces in rural areas require designing different set-ups, processes and products to serve the market in order to lower costs per unit lent for the bank and transaction costs for the client. These client transaction costs are important to consider as they determine a bank's outreach. A detailed analysis of the cost structures of the different types of products and services will help better understand how each of them is impacted by rural market constraints.

Information Costs Are the Main Cost Driver for Lending Operations

The marginal cost structure of credit delivery from the bank's perspective is mainly composed of transaction costs related to marketing, risk assessment and loan monitoring functions, requiring high staff competencies, and proximity (regular visits and contacts between the bank's qualified staff and the clients). The provision of loans in rural areas requires specific promotion actions aimed at attracting distant clients and at educating them (enhancing their credit culture) with the aim of reducing default risk ex-ante. However, the cost of promotion and loan appraisal strongly decreases in case of renewals, leaving loan monitoring as the main cost-generator. Costs can be lowered on the transaction side by adapting product features (such as group lending, transferring part of the transaction costs from bank to client, standardized products with bullet repayment, etc.), and on the production side by an appropriate

organizational set-up, which must however take into account the need to maintain regular contact and visits to clients in order to control default risk.

Credit delivery costs also comprise costs related to cash transactions (loan disbursement and repayments). These costs are subject to the same constraints as in the case of other financial services (see below), though less impacted in the case of credit insofar as cash transaction amounts and timing are predictable.

On the client's side, any step of the loan process requiring going to the branch (for loan application, repayments) generates higher transaction costs in rural areas, hence limiting outreach. One of the strengths of the group lending approach in rural areas is that it makes it possible to reduce transaction costs, both for bank and client, in different proportions depending on the processes.

Thus, the main cost of lending in rural areas is information cost, which includes both risk assessment costs – very high for first-time borrowers – and loan monitoring. Marketing is costly but decreases once activity is established. Cash transactions account for a smaller part of costs.

Cash Management Is the Main Cost-Driver for Deposit Services

The provision of savings and deposit services involves marketing and promotion actions, including the cost of establishing and disseminating a strong image to gain clients' trust, as well as educating clients on savings. Again, this must be done by qualified staff, and is impacted in the same way as for credit services by low population density, poor financial literacy and, in some remote areas, difficulty of keeping qualified staff.

Production costs incurred by the bank in the case of deposits and savings arise from the need to enable cash withdrawals and deposits *whenever* clients need to and *close* to their locations (hence lowering the transaction cost for the clients).

Cashier functions involve higher production costs in rural areas for the following reasons:

- (Low) efficiency costs: The number of clients per branch is usually lower, which makes the fixed costs per operation higher. This observation leads to the question of the minimum sustainable number of clients per branch and points out that reasonable occupation of main functions is an important driver of efficiency;
- Security costs: Cash transaction processing outside full-fledged branches is less secured (in the absence of real-time connection to MIS, low security infrastructure, and due to the distance from supervisory and control functions), hence requiring high control costs and generating losses in case of errors or frauds;
- Cash management costs: Transport costs for cash are higher due to longer distances (more hours driving, higher occupation of armed vehicles and related staff, higher number of vehicles needed). Non-secured cash transportation is a common practice but its net cost-impact remains to be determined as it generates risk-related costs.

Thus, offering deposit and savings services in rural areas involves high production costs mainly related to cashier services. Besides these production costs, the costs incurred to provide clients with information on their accounts and on available products is also affected by larger distances between the bank and its clients.

... as Well as for Remittance and Payment Services

In the case of remittance and payment services, the main costs are related to cash management, impacted as described above by the rural environment. Exchange of information is critical and may raise costs in rural areas: These services require real-time information exchange (on amounts transferred, on bill amount to be paid, etc.). Clearly, it is the "last mile" of delivering such services that remains the most challenging and the most costly. Thus on the whole, and even more so than in urban settings, microfinance has needed to explore different cost-reduction solutions in order to pioneer financial services delivery in rural areas.

3 Increasing Outreach Through Branchless Banking

In recent literature, **branchless banking** most often refers to "the delivery of financial services outside of bank branches using information and communications technologies and non-bank retail agents, for example, over card-based networks or with mobile phones."[5] In rural finance, different solutions have been experimented with – neither necessarily based on technology nor on external retail agents – to provide financial services outside a branch infrastructure. We will consider all these models in this section, including under the term "branchless banking" both technology-based and non-technology based approaches allowing the delivery of financial services outside conventional bank branches. Let us however underline that, in all cases, the term branchless banking is misleading in that it suggests that branches are irrelevant in these models. The idea is rather one of banking beyond branches, as termed by Alexandre, Mas, and Radcliffe.[6]

Branchless banking models require communication of information on remote operations that can be considerably facilitated by ICTs.[7] Different technologies can support different types of organization, as presented in Table 1. *This paper does not focus on the technologies used but on the different types of organization a bank can set up to bank beyond its branches.*

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[5] See Mark Pickens, David Porteous, and Sarah Rotman, "Scenarios for Branchless Banking in 2020", CGAP Focus Note No. 57, 2009 www.cgap.org/gm/document-1.9.40599/FN57.pdf (last accessed 16 October 2010).

[6] Claire Alexandre, Ignacio Mas, and Daniel Radcliff, "Regulating New Banking Models that Can Bring Financial Services to All", 1 August 2010, http://ssrn.com/abstract=1664644 (last accessed 16 October 2010) Alexandre et al. (2010). See this paper for a detailed discussion of the concept of "banking beyond branches".

[7] Information and Communication Technologies.

Table 1. Impact of alternative distribution channels on costs per type of product

Distribution Channel	Technology involved	Credit	Deposits and Savings	Payment and Transfer Services
Mobile branches / Periodic offices / Small light offices	PDAs, POSs, mobile phones can be used to increase security of transactions	**Impact on costs:** production costs per unit and transaction cost reduced for both FI (increased staff productivity) and client **Outreach:** outreach remains limited by long distances / low population density	**Impact on costs:** production costs per unit and transaction costs reduced for both FI and client **Outreach:** strongly limited by distance/ frequency of office opening	Not adapted
Roaming officers	PDAs, POSs, mobile phones can be used to increase security of transactions	**Impact on costs:** transaction costs reduced for client **Outreach:** increase in outreach, transactions can be secured by technology, risks in case of cash handling, facilitation of group technology	**Impact on costs:** transaction cost reduced for client **Outreach:** specific service increasing outreach, adapted for planned savings (forced savings / susu) or densely populated zones	Not adapted
ATMs	plastic cards or mobile phones and platform mandatory	**Impact on costs:** production costs per unit and transaction costs reduced only for cash-out transactions: loan disbursement. Maintenance costs very high **Outreach:** not adapted to remote rural areas – can be coupled with agents / roaming officers	**Impact on costs:** production costs per unit and transaction costs reduced only for cash-out transactions: withdrawals. Maintenance costs very high **Outreach:** increased in market towns (access to cash-out and increased hours of operation)	**Impact on costs:** production costs per unit and transaction costs reduced only for cash-out transactions. Maintenance costs very high **Outreach:** increased in market towns (access to cash-out and increased hours of operation)
MPS (external)	POSs or mobile phones & platform mandatory	**Impact on costs:** production and transaction costs on cash operations reduced for both FI and client, net impact depending on MPS prices. Other transaction costs, linked to loan appraisal and monitoring not impacted. Possibility to adapt/ offer more flexibility in product processes (e.g. repayment plans, scaled disbursements) **Outreach:** will remain constrained by necessity to maintain proximity	**Impact on costs:** production and transaction costs strongly reduced by the outsourcing to external agents having sustainable business, for both FI and client, net impact depending on MPS prices **Outreach:** significant impact on outreach, secured transactions, limited risk	**Impact on costs:** strong impact **Outreach:** possibility to extend the service range offered to existing clients, reach new clients for such services / account to account transfers not possible
Mobile Cashless Services (no cash transactions)	mobile phones	**Impact on costs:** transaction costs slightly reduced (information request, installment reminder…), for both FI and client **Outreach:** no impact on outreach	**Impact on costs:** transaction costs reduced only for non cash operations (account to account transfers, push and pull information), for both FI and client **Outreach:** will remain constrained by the necessity to offer easy access to cash transactions	**Impact on costs:** transaction cost reduced only for non cash operations (account to account transfers, information) **Outreach:** will remain constrained by the necessity to offer easy access to cash transactions
MB (internal)	POSs or mobile phones and platform mandatory	**Impact on costs:** see MPS, but prices are internal costs + SMS **Outreach:** will remain constrained by necessity to maintain proximity	**Impact on costs:** see MPS, but prices are internal costs + SMS **Outreach:** significant impact on outreach, secured transactions, limited risk	**Impact on costs:** strong impact **Outreach:** possibility to extend the service range offered to existing clients, reach new clients for such services

An analysis of different branchless banking models will help us understand how cost efficiency can be enhanced. We will differentiate between internal solutions for branchless banking from solutions partly or entirely relying on outsourcing, as the issue of outsourcing raises specific questions. We will also differentiate between financial products and services when relevant.

3.1 Branchless Banking: Banks' Internal Solutions

In rural areas, banks have long set up alternative delivery channels to provide financial services outside full-fledged branches at lower costs.

Low-Cost Retail Outlets

Alternative retail outlets have been set up in rural areas that reduce both production and transaction costs while offering the same services as full-fledged branches:

- Setting up small-sized offices with lighter infrastructure[8] but providing a full range of services: In this case, fixed production costs remain relatively high since minimum equipment remains necessary to handle cash. The level of cash to be maintained to avoid cash shortage also remains high as do all transaction costs related to promotion, loan assessment and monitoring (because of the low concentration of clients). Overall, the reduction in transaction costs for the bank depends on the geographic concentration of clients in the office's area;
- Having such offices open only one or two days per week (market day, etc.) allows a better allocation of staff resources (both cashiers and loan officers, LOs), who can cover several areas.[9] This however reduces quality of service;
- Mobile retail outlets, using vehicles such as buses:[10] fixed production costs may be significantly reduced compared to the first two solutions, while the

[8] Numerous examples among which PADME in Benin, FCPB in Burkina Faso, BNDA in Mali, Opportunity International Malawi (see Bryan Campbell and Aleksandr-Alain Kalanda, "Banking Rollout Approaches to Rural Markets – Opportunity International Bank of Malawi", OI White Paper N°8, 2008, as well as the famous 4-staff units of BRI in Indonesia.

[9] Al Amana in Morocco and BNDA in Mali, for example, have set up periodic offices in rural areas opening on market days.

[10] ProCredit Moldova, for instance, operates three mobile offices in the northern, central and southern parts of the country in order to maximize geographical coverage. See ProCredit Bank Moldova, Annual Report 2009, www.procredit-holding.com/front_content.php?idcat=26 (last accessed 16 October 2010), p. 24.

Al Amana in Morocco also operates 35 mobile offices in its scattered rural credit program and plans to increase this number (own field work, Sept. 2010); precise cost analysis will be set up and interesting to follow. Other banks (e.g. CNCA Morocco) have stopped using mobile offices following cost analysis.

service range offered to the clients is similar to that of the previous solution. However, higher operational costs and security (of cash and of staff) may offset the savings in investment costs, depending on context.

In the three models presented above, portable equipment such as personal digital assistants (PDAs) or point of sales devices (POSs) can be used to secure transactions at reasonable investment costs. However, access to a telecommunication network to ensure real-time or daily transfer of information can be an issue in some remote rural areas.

Alternative Delivery Method: Roaming Officers[11]

One of the most widespread solutions to reach rural areas consists in having roaming officers going into the field to perform transactions such as account opening, application registration, loan appraisal and monitoring, and possibly cash transactions. Such an organization significantly reduces costs: client-transaction costs, but also bank-transaction, and production costs. Cost-efficiency will depend on the number of clients that a roaming officer is able to serve (hence depending on population density and transportation infrastructure).

Roaming officers are usually dedicated to credit (possibly associated with compulsory savings linked to credit) and/or to on-the-field savings collection.[12] However, in the case of savings collection, frequency highly impacts transaction costs or limits outreach, so that it might not be cost-effective in remote rural areas. Withdrawals as well as transfer and payment services are difficult to offer through roaming officers, as (i) they would require the officers to transport larger cash amounts, and (ii) they require real-time information access to the bank's MIS.

Main issues to be addressed are how to secure cash and transactions, and to ensure staff safety:

- When transactions are done manually (using vouchers), the level of risk is very high, though it can be reduced by appointing a team of two people, one being in charge of transactions registration, the other of cash handling;
- Transactions can be better secured when agents are equipped with PDAs, POSs or mobile phones connected to the MIS (see below), which however are strongly dependent on access to telecommunication networks.

[11] The term "roaming officers" has been preferred here to that of "mobile officers", which could have been misleading in a discussion around mobile banking in which mobile often refers to mobile phones.

[12] SafeSave in Bangladesh used roaming officers equipped with PDAs to collect cash on the field, both for credit repayment and savings: roaming officers called clients on a regular basis, offering them to come and collect cash if needed.

Roaming officers have thus proven to be an efficient solution to increase outreach in rural areas, mainly for credit and sometimes savings collection. Security and risk issues are however to be addressed, possibly with the help of modern technologies.

Staffless Delivery Channel: ATMs

Implementation of stand-alone ATMs in rural areas helps to secure cash transactions at reduced production and transaction costs, although investment and cash management costs remain high making it profitable only if a minimum number of transactions per time unit is ensured. They are an option for withdrawals, loan disbursements, informational purposes and transfers between accounts but, in many contexts, cash-in operations seem difficult to offer, as banknotes are often damaged, hence not recognizable by ATMs.

Use of ATMs reduces staff costs. Investment and maintenance costs, however, remain relatively high, as well as cash management and transportation costs. Additionally, using stand-alone ATMs in rural areas faces a number of limitations: a permanent connection and power supply are required, maintenance is much more costly due to distance and repair more complicated and suffering longer delays. As a consequence, if the number of transactions is low, ATMs might prove too expensive in rural areas.

Opportunity International, which launched a program in Malawi including the implementation of high-tech ATMs in particular in rural areas, concluded three years later that serving the poor in rural areas is much more challenging from an infrastructure standpoint than in the urban areas. They have taken measures to reduce ATM costs:

- Switching from smartcards to magstripe cards, reducing the cost per card;
- Moving the biometrics from the smartcard to the switch;
- Placing ATMs in locations with the highest traffic levels and then using merchant agents for other market areas that don't justify the cost;
- To address education, utilizing the guard who is watching the ATM to handle customer training – by using biometrics, this is a low risk approach to getting the customers educated; while customers are often illiterate they are not innumerate and with some guidance, they catch on pretty quickly.[13]

Thus, having ATMs available in market towns, combined with roaming officers and third-party agents (see part 2.2.), might be an interesting solution to provide a full range of services and reduce risks and costs linked to cash transportation.

[13] From e-mail exchange with Daryl Skoog, Chief Technology Officer at Opportunity International Network, Oct. 2010. See also Campbell et al. (2008).

SMS Information Services to Facilitate Data Exchange

Mobile phones can make it easier to exchange data with clients at reduced costs: information can easily be provided by SMS, both on request of the client ("pull"): account balances, mini statements, amount due, etc., and sent by the bank ("push"): installment reminder, new services available, invitation to meetings, etc. This implies a reasonable investment cost depending on the MIS (a light application has to be added) and transaction costs usually remain low (see Table 3).

Table 2. Elements of Costs for Different Technologies

	entry cost (system set-up)		**cost of each additional device**		**transaction cost**	
PDA	**	– requires specific developments to "mobilize" part of the CBS application – requires an in-depth market research to select the technology an devices	**		*	
POS – internal	***		*		*	
mobile payment - external	**	– moderate: connexion between Telco & FI MISs for bill payment – moderate +: for account information & transfer from / to account	(negligible)	-	**	can be high
mobile payment – internal	****	– high: specific MB soft + connexion to Telco system + promotion	*	unit cost of agent management	*	cost of SMS sent by the FI Beware, some providers ask for an annual fee per active customer
SMS-banking only	**		0	-		cost of SMS sent by the FI
ATM-self-supported by the FI	***	– cards system software, interfaced with CBS – Set-up fee to install and network the ATMs	****	unit cost of each ATM (+installation+ maintenance…)	**	– costs depend on the nature and volume of cards issued – costs of refilling ATMs with cash…
ATM – joining an existing network	**	– network participation fee – Set-up fee to install and network the ATMs – interface with CBS	***	unit cist of each ATM (+installation+ maintenance…)	**(*)	Usage fee, either per transaction or on a monthly basis Careful: if Visa (or other international network): investment may be lower but transaction fees are hefty!

Source: Horus estimates

Table 3. Stylized cost structure of 1G & 2G Banking Models

		Branch-based (1G)	***POS-based agent banking (2G)***	***Cell phone-based agent banking (2G)***
Fixed costs per outlet	*Start-up cost per outlet*	$100,000 Office setup 7 conditioning, computer equipment, security, etc.	$2,000 Installation including POS terminal, communications line, training & marketing	$500 Training & marketing only; no equipment cost
	Useful life	10 yrs.	3 yrs.	3 yrs.
	Operating cost per month per outlet	$8,000 10 salaries, rent, office maintenance	$300 Equipment maintenance & supplies (e.g. paper, marketing materials)	$50 Marketing materials only
	Maximal transaction per outlet per month	$18,000 7 teller, each doing 10 transactions per hour, 8 hours per day, 5 days/week	$3,000 1 terminal, 10 transactions per hour, 10 hours per day, 30 days per month	$3,000 Ditto
Variable cost per transaction	*Communications cost per transaction*	$0.01 Minimal charge for uploading from IT system	$0.05 The equivalent of 1 SMS per transaction	$0.15 The equivalent of 3 SMSs per transaction
	Agent commission per transaction	*	$0.10	$0.10
Fixed cost per new customer	*Customer acquisition cost*	$5.00 Cost of handling directly at branch	$2.00 Procession cost & sign-up commission paid to agent	$2.00 Ditto
	Customer credentials (card)	$5.00 Half the customers get a bank card	$10.00 Card issuance and maintenance costs	%0.20 Over the air configuration of phone
	Average customer lifetime	36 month		
Back-office costs	*Back-office cost per customer per month*	$0.30	$0.30	$0.30
Revenue to bank		4% p.a. interest spread + $0.50 per transaction		
Customer costs per transaction (not borne by provider)		$0.50 bus ticket + 2 hours travel & queuing time	30 minutes total time	30 minutes total time

Source: Mas (2009) – all figures in USD

All of these different delivery channels developed internally by banks significantly reduce transactions costs for clients, hence increasing access. They however often induce significant production costs for banks unless a minimum concentration of clients is achieved. Their adequacy therefore very much depends on context.

3.2 Branchless Banking: How ICT Boosted Outsourcing Possibilities

In many sectors of activity, selling products and services through external distribution networks is a very common way for producers to reduce transaction costs. Although some banks have been performing transactions with clients outside of

branches using third-party agents for a long time,[14] ICT opens new possibilities for this type of partnerships between banks and agents (whether existing networks or networks set up by the bank itself). We will first look at information flows allowing outsourcing of transactions, then at what can be outsourced.

Information Management

In order to outsource a transaction, a bank needs to communicate data from its MIS to the third-party agent who is going to perform the transaction on its behalf and, after completion of the transaction, from the agent to the bank's MIS. Although an online connection is preferable, it is also possible to operate with periodic batch transactions or even transmission of paper information that will need to be entered manually in the bank's MIS.[15] This reflects the reality of many rural MFIs' outlets,[16] either for connectivity reasons (technical or cost) or because of the limitations of their MISs (in some cases, all outlets are not computerized and data capturing is done in a remote office based on paper documents).

Security of transactions is tremendously increased by automatic entry of data in the bank's MIS, which ensures exhaustivity of data and integrity of processes. This opens the possibility of working with independent agents who could not be monitored closely enough without automation of transactions. On-line connection is moreover indispensable for some types of transactions (immediate withdrawal from bank account, for example).

What Can Be Outsourced?

Different functions are outsourced in different banks. The functions that can be outsourced include:[17]

- Cash transactions linked to money transfers, payments (including bills, retirement and social benefits, salaries, mobile phone airtime top up, insurance services), and cash transactions to/from bank accounts (loan disbursement, loan repayment, deposit taking, deposit withdrawal);
- Communication with bank (balance enquiry, mini-bank statements, cheque book request). This can also be done through simple SMS;

[14] As PADME in Benin at its beginnings with Financial Bank, FIDES in Namibia with Postal network, also in developed countries financial advisors canvassing clients to sell banks' financial products.

[15] This is the case of many MFIs working with post offices, as Finadev in Benin or FIDES in Namibia.

[16] This is the case, for example, of most of Morocco's small and medium-sized MFIs and of AMRET in Cambodia until recently.

[17] See Central Bank of Kenya, *Guidelines for Agency Banking* (2010) and Reserve Bank of India: Circular Financial Inclusion by Extension of Banking Services – Use of Business Facilitators and Correspondents, http://rbi.org.in/scripts/BS_CircularIndexDisplay.aspx?Id=2718.

- Client management (opening of deposit or savings accounts, collection and preliminary processing of loan applications, promotion and nurturing of joint liability groups, loan follow-up and post-sanction monitoring).

Outsourcing the latter two kinds of transactions however requires specific skills that all agents are not necessarily capable of acquiring and that entail accrued training and supervision costs. The most critical to enhance outreach and the easiest to outsource are cash transactions.

Certain critical steps in the lending process cannot be outsourced, namely (i) risk assessment, except in cases where enough information is available to use a credit scoring model,[18] (ii) loan monitoring, and (iii) loan recovery. All three are key to control portfolio quality.

One important issue is safety and confidentiality of the client's financial operations. In order to protect it, agents must meet defined material requirements. On top of this, some systems confine agents to a role of "ignorant tellers"[19] i.e. tellers who cash in or out without knowing what operation a client is coming for, the system only sending them the information they need: "please cash out $10 to Ms. Xxx" / "please cash in $5 from Mr. Yyy". This leaves it to the client to decide whether or not he wants his agent to know what operation he is handling. Another advantage with such a system is that qualifications required from an agent are very low: it is sufficient that he is honest and trustworthy, numerate, able to count money and manage his cash needs; if he is to do other than cash operations, he will need to be able to read and write.

3.3 Branchless Banking: Different Types of Partnerships

Outsourcing by Partnering with Existing Financial Institutions

The idea of teaming up with existing networks of financial services providers to deliver a bank's services is not new: It has been successfully implemented for years by many credit-only MFIs to supply credit services.[20] In countries where a reliable bank or post network reaches deep enough in rural areas, partnering with it for cash management reduces the infrastructure that is necessary for the MFI's activity: loans can be disbursed through checks or transfers to account if the client has an account with the partner-bank, and repaid at the partner-bank's tellers. In some cases, the transactions are supported by POS devices and plastic cards to facilitate transfer of information to the MFI's MIS.

Results from experience show that this type of partnership is an effective way of cutting costs for credit-only MFIs but can be subject to limitations:

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18 As planned by for M-Kesho in Kenya.

19 This is the case, for example, of Noomadic at Xacbank Mongolia.

20 Further examples: Tadjik MFIs IMON and Humo with Agroinvestbank, Kenyan MFIs with different banks.

- Partner's capacity/willingness to serve the MFI's clients with the required level of quality;
- Possible competition between the MFI and its partner in delivering similar services (partner might use its knowledge of the MFI's clients to open a competing service; MFI cannot use the partnership to supply those services which the partner himself already offers).

Outsourcing by Partnering with Existing Mobile Payment Systems

In an increasing number of countries, mobile payment services (MPS) are available on the market: We hereby refer to systems in which a non-bank institution has set up a technical platform processing electronic transactions and a network of agents handling cash transactions. These services are very often based on mobile phones, the best-known being M-PESA, but can also be card-based, as is the case of e-zwich in Ghana (see Box 1 for clarification of the different notions linked to "mobile banking"). In these cases, clients hold an account with the MPS provider (e-wallet), where they can store value (known as e-money) to pay for services (bills, airtime) or to transfer money or airtime (to friends, relatives, business partners).

As compared to accounts in banks, e-wallets at MPS providers' have larger outreaches as they are more easily accessible (account opening procedures and know-your-customer regulations are usually lighter for such accounts), and are often operated by Mobile Network Operators (MNOs) with huge existing networks and marketing power. Proximity thus makes it possible to strongly reduce transaction costs for clients. However, e-wallets cannot be a substitute for bank savings accounts as, typically, due to regulation, their balance is capped and no interest can be paid on the e-money stored. Hence, the possibility to make transfers from an e-wallet to a bank account at a reasonable cost is important if e-wallets are used to facilitate savings services.

Possible partnerships between MPS providers and banks consist in:

- Easiest and most frequent: using clients' e-wallets as transit accounts to conduct cash-in transactions to the bank (loan repayment and in some cases deposit on savings account), most frequently using the bill payment function of the MPS.[21] This is generally not done based on an online connection between MPS provider and bank but on a daily batch transfer of funds and related information. A significant advantage as compared to partnering with another financial institution is that the data is directly transferred to the bank's MIS without need for re-entry with the costs and risks associated.

  This can lead to a significant reduction in transaction costs: (i) for the client as compared to going to his bank branch or a partner bank branch or (ii) for the bank as compared internally processing cash transactions or to

[21] The best-known example is M-PESA, with Faulu, SMEP and KWFT, see Anjali Kumar, Ajai Nair, Adam Parsons, Eduardo Urdapilleta, "Expanding Bank Outreach through Retail Partnerships, Correspondent Banking in Brazil", World Bank Working Paper No. 85, 2006.

Box 1: Clarification of the Different Notions Linked to "Mobile Banking"

Mobile banking consists in offering financial services to consumers through their mobile phones. The term is also sometimes used for remote transactions based on other technologies (e.g. plastic cards and POS devices).

Several distinct notions are often included under the words "mobile banking":

- **"Information services"**: exchange of financial information, initiated:
  - By a financial institution ("push"): alert, transaction receipt, marketing message;
  - By the client ("pull"): balance inquiry, request for statement.
- **Mobile payments:** person-to-business payments that are made with a mobile phone:
  - Non-cash payment of goods at merchants
  - Payment of bills (cash or non-cash)
  - Repayment of loans to a bank or MFI
- **Mobile money transfers:** person to person transfer (requires cash transactions to deposit and collect the money transferred)
- **Mobile banking (narrow definition):** connecting a mobile phone and an account in a bank, to allow customers to use the mobile phone as another channel to access financial services:
  - Deposits / withdrawals on current account
  - Information services
  - Mobile payments
  - Mobile transfers (both cash and account to account)

the LO collecting the funds; depending on the MPS prices, the cost-reduction will cover the commissions or not. The bank's costs can also be impacted in the case of group-lending by a reduction in the time spent in group meetings that can lead to higher LO productivity, thus reducing transaction costs per loan. Effective increase in the productivity of a LO will very much depend on the context;

- Integrated offer, by which clients can access their bank account and other services through the MPS in real-time, either for cash-in or for cash-out. Some systems work only with one bank account (M-Kesho Kenya associating M-PESA and Equity Bank[22]), others can link several accounts to one

[22] In May 2010, M-PESA and Equity Bank in Kenya announced the most integrated product offering so fara low-cost, low-entry microsavings account called M-Kesho. With this account, Equity Bank hopes to convert the majority of M-PESA's 9.4 million users into account holders at the bank and plans to offer microinsurance and microloans in

mobile phone, i.e. current account, savings account, loan account (Tameer/ Telenor in Pakistan) or offer transfers from e-wallet to any bank account. M-Kesho also opens access to a personal accident insurance policy and, once six months of transaction data are available, an instant loan product based around a credit scoring model.[23]

Thus, using an existing external mobile payment system that channels cash to the bank can lead to significant reductions in transaction costs, both at client and at bank levels, which make it possible to increase outreach for deposit and savings services and also sometimes for loans. In this case, outsourcing is necessarily limited to cash transactions.

Conditions to Increase Outreach Through Partnering with Financial Services Providers

Let us look further into the impact of critical elements on the success of a bank-financial services provider partnership: price, place and information exchange.

A change in the pricing of a partner financial services provider will have immediate repercussions on the bank's transaction costs and, depending on its scale, a bank is not always in a position to negotiate, be it with post or MNOs. Concerning mobile payment networks, Kenyan MFI clients[24] found M-PESA charges inferior to their previous transportation costs, which was critical to their adoption of the system; however this cannot be generalized as Kenyan MPS prices are much lower than those of MPS providers in other countries[25] and this type of partnership often fails because of the difficulty of defining an economic model that is satisfactory for both the MPS provider and the bank.[26]

addition to savings accounts. Very few institutions have the negotiating power of Equity Bank to achieve this, but this joint venture has the potential to extend access to formal financial services to millions of currently unbanked individuals. M-PESA has since replicated this agreement with other banks and Equity Bank launched a one-year exclusive partnership with Orange's Iko-Pesa in November which it plans to replicate in neighboring Uganda, Tanzania, and Rwanda.

23 In Claudia McKay, "From rural outpost to boomtown: How banking services transformed a town in the Amazon", CGAP technology blog, 2010 the author describe sixs "New Products Riding the M-PESA 'Rails'".

24 See Kumar et al., 2010.

25 This is the result of a benchmarking done by Horus Telecom and Utilities. The reasons for this difference in costs are not clear; they should certainly be related to the volume of operations and the competition on the Kenyan mobile banking market, also to an aggressive pricing strategy aiming at encouraging clients to test and use the novel mobile payment services, and to DFID's support which led to setting up a small, autonomous and highly motivated team to manage the launching of M-PESA.

26 Orange in Senegal, for example, partnered with PlaNet Finance since 2008 with a support from the Bill and Melinda Gates Foundation to set up partnerships with MFIs. But the program failed due to the difficulty of coming to an agreement between MFIs and MNO on the business model.

The agent network's coverage is also a point that appears critical. In rural areas especially, different mobile payment networks might not cover the same areas and the financial capacities of the MPS provider's agent network might not be sufficient to cover the amounts needed for the bank's transactions. Thus, before entering into an agreement with an MPS provider, a bank needs to make sure that its agent network will be capable of delivering the services necessary, both geographically and financially.

A limitation that appears in most partnerships between banks and existing financial services providers is that technical reasons make it difficult to take into account changes in the amount of a loan repayment (interests on delay, late penalties, indexation), for reasons linked to the communication format with the partner institution, or to the software used in case of mobile payments, the billing function not being designed for financial products. The introduction of POSs can be a solution to explore if cost is bearable by the activity.[27]

Whereas partnering with existing financial institutions is clearly in most cases not adapted for savings because it would compete with the partner financial institution's services, as we have seen partnering with a mobile payment system can in some cases allow access to savings or current accounts. However, the ease of transfer from e-wallet to bank account and its cost will be decisive to effective use of the service.

It thus appears that the impact on outreach and transaction costs of partnering with financial services providers for the delivery of a bank's services varies, depending on the price of the agents' services, the adequacy of the agent network for the bank's clientele and the specificities of the bank's products.

3.4 Setting Up a Bank-Led Mobile Banking System

For a bank, setting-up its own mobile banking system basically consists in outsourcing teller activities to external cashiers holding an account in the bank. Just as with an MPS provider, authentication and registration of transactions can be done by mobile phone or by card. This will result in a bank-led mobile banking system (for a synthesis of the differences between bank-led and non-bank-led mobile banking schemes, see Box 2). The major difference with a MPS is the fact that there is no e-wallet: the bank-led MB is an additional distribution channel to access bank accounts, which are therefore much more easily accessible.[28] The main advantages for banks of setting up their own MB are:

- It contributes to promoting savings, as it gives the clients easy access to money on their deposit account and increases transparency through SMS information;
- Bank sets pricing according to its own interests;

[27] FIDES Namibia is contemplating this solution in its partnership with the postal network.

[28] As for example Xacbank Mongolia, Opportunity Bank Malawi, see Kumar et al. (2010), Cajas Vecinas Chile.

- Banks determines the product range with financial services eyes;[29]
- Bank-led schemes are potentially open to customers of all mobile operators (provided the bank negotiates agreements with these operators);
- The money "stays in the bank" whereas with non-bank solutions involving e-money, the float (total value of e-money issued) goes to a financial institution not necessarily interested by a small rural clientele;
- Cross-selling effects are easier to create, for example clients coming to save can build up a history of transactions which can be taken into account for future loan appraisals.

Box 2: Differences Between Bank-Led and Non-Bank-Led "Mobile Banking"

Mobile banking schemes are often classified with reference to the promoter of the system:

- **Bank-led scheme** (corresponding to our narrow definition of mobile banking):
  - Client has a contract with a regulated financial institution;
  - Mobile banking is used by the financial institution as an additional channel to distribute existing financial services outside of its branches;
  - Mobile banking transactions are made directly on the client's current account.
- **Non-bank-led scheme** (this is what we refer to here as mobile payment services):
  - Client has a contract with a non-financial institution (Mobile Network Operator, Payment service provider…);
  - Clients exchange money for a stored electronic value ("e-money") that they can use to pay goods and services or transfer to another account holder;
  - E-money is stored on a specific account, called "virtual account," "electronic wallet."

[29] See: McKay et al., 2010: "MNOs, which have often led the first wave of innovation in branchless banking in some countries, are not well positioned on their own to lead a new wave if it entails offering a broader range of products. Finally, some MNOs will find mobile payments do everything they want them to do: increase loyalty among voice clients and decrease the cost of distributing airtime. In other words, they may have no motivation to do more", p.10.

We will now look at third-party agents, discuss the critical success-factors of dealing with the principal-agent dilemma and managing cash, and then explore the challenges that need to be met in order to set up a third-party agent network.

Who Are Third-Party Agents?

Third-party agents are existing commercial outlets that can be very varied: village shops, pharmacies, gas stations, lottery kiosks, cybercafés, post offices, MFIs,[30] etc. As a prerequisite for being a financial institution's agent, they must have an activity involving cash transactions and be ready to manage a sufficient level of funds; moreover, their existing activity should cover their fixed costs. As agents typically incur very few specific fixed production costs for offering the banking services, except for the necessity of maintaining a sufficient level of float (see below), the fact that the contribution of their agent revenue is marginal dramatically reduces the break-even point related to the provision of financial services. As a consequence, they have the capacity of reaching out much further than bank branches.

The Bank – Agent Relationship

A challenge to successful outsourcing is the management of the principal agent problem, i.e. the difficulties that arise when a principal hires an agent, such as the problem of potential moral hazard and conflict of interest, inasmuch as the principal is —presumably— hiring the agent to pursue its, the principal's, interests.

The benefit a shopkeeper can expect from becoming an agent is not only financial (from the commissioning). Other important aspects are: increasing visibility, attracting new customers with cross-selling effects, and making better use of existing infrastructure and available staff time. Reciprocally, the agent's image will impact the bank's: a bank partnering with well-established agents will gain in visibility and potentially attract new clients, whereas partnering with agents having a bad reputation will jeopardize the bank's image. The way agents treat the bank's customers will also reflect on the bank's reputation. Moreover, in cases where the agent also delivers financial services other than those of the bank, conflict of interest arises.

All these elements need to be taken into account when choosing agents and defining the economic model, the contract and the monitoring system so as to bring the agent's interests into alignment with the bank's interests and to be able to adjust quickly if necessary.

[30] Central Bank of Kenya, for example, has issued guidelines for agency banking in May 2010, including the possibility for MFIs and SACCOs to act as banking agents.

Managing the Cash

Cash management is the critical aspect of the agent business. We will now look at how this is handled in various contexts. The main obstacles agents meet in this regard are:

- Employee malfeasance, as store owners must almost always leave a large amount of money in the hands of employees in order to rebalance their float;
- Physical security;
- Travel cost and time, which has to be factored in the analysis of the profitability of the financial services activity for the agent.[31]

The total amount of transactions external agents can operate as well as the unit amounts they will be authorized to handle will be limited by their financial capacities: typically when working with small independent agents, cash transactions are offset by corresponding transactions in the agent's account at the bank, whereby the agent is only authorized to receive cash up to the amount available on his account (float) – when an agent cashes money in on account of a bank, it is dealt with as if he were taking money out of his account. Obviously, he can only hand out the cash he has at hand. As cash-in and cash-out transactions are not always balanced in a given period of time, agents might be unable to perform requested transactions. The financial capacities needed for an agent depend on his proximity to a place where he can cash in and out on his account and the delay with which his account will be credited. One way of addressing the problem of agents' financial capacities is to structure the agent network with different levels presenting a graduation of financial capacities. Masteragents can be used who are responsible for managing the cash and electronic-value liquidity requirements of a particular group of agents;[32] their operations are more challenging in rural areas. In Kenya, some M-PESA agents who are located near to their masteragent's branch can renew their cash two to three times daily while more rural agents do so once a day or once every two days, with over an hour travel time.

Density of the agent network in the bank's areas of operation is a key factor to enable proximity and convenience for the customer base. The economic activity in rural areas generates short travels towards hotspots (markets, high circulation

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[31] Frederik Eijkman, Jake Kendall, and Ignacio Mas, "Bridges to Cash: the retail end of M-PESA. The challenge of maintaining liquidity for M-PESA Agent Networks", 2010. http://www.cgap.org/gm/document-1.9.49720/Bridging_%20the_Cash.pdf.

[32] A masteragent is a person or business that purchases e-money from an MNO wholesale and then resells it to agents, who in turn sell it to users. Unlike a superagent, masteragents are responsible for managing the cash and electronic-value liquidity requirements of a particular group of agents. See GSMA, "Mobile Money Definitions, Mobile Money for the Unbanked", 2010. http://www.slideshare.net/sarper/mobile-money-definitions.

crossroads etc.) where it is possible to find retail shops, petrol stations and sometimes MFI/banks' branches which can be used as points of services for remote financial services as well as relays for smaller agents located in remote areas.

Setting Up an Own Third-Party Agent Network

Setting up and managing an agent network is a lot of work, which translates into costs: identification of agents, training, close monitoring to make sure they are handling operations well, control, hot-line for support in case of problems. In building its agent network, a bank will choose one or a mix of the following strategies:

- Rely on pre-existing networks (typically major retail chains, gas-stations networks, post offices or MFIs). The heads of networks typically function as masteragents[33] and will participate in the supervision of their agents. Masteragents will need to organize the support to their agents' cash withdrawal and deposit needs, either by setting up cash-managing branches or by identifying higher-level agents or banks with whom their agents can deal;
- Select independent retail shops and manage them directly (banks are in a good position to identify such agents among their individual shopkeeper clients);
- Outsource the building and management of chains of agents to third-party agent management companies who sign up, equip, train and maintain agents on the behalf of their client.[34]

Banking Correspondents: A Specific Type of Third-Party Agents

Some banks use banking correspondents whose role is not limited to cash transactions but who also act as intermediaries authorized to sell some of the bank's products and services. This has proven to be an efficient way of increasing outreach, in Brazil for example.[35] The main differences between a bank-led mobile banking system and a network of banking correspondents are that (i) the range of outsourced transactions is broader and (ii) banking correspondent networks have usually been set up based on card and POS technology.

Although some regulations allow a significant participation of banking correspondents in the loan process (collection and preliminary processing of loan applications including verification of primary information, financing proposals, dis-

[33] Like PEP in Kenya for M-PESA, see Eijkman et al., 2010.

[34] Banco Popular in Brazil (the banking correspondent brand of Banco do Brasil) uses companies such as NetCash in Sao Paulo State and the Brasilia Federal District and PagFacil in Pernambuco. Lemon Bank in Brazil has no branches at all and relies on 16 agent management companies (including three that it purchased) to manage the majority of its 5,750 agents. See also Gautam, 2008.

[35] See Kumar et al., 2006; Rotman, 2010; and McKay, 2010.

bursement of small value credit, follow-up for recovery, post-sanction monitoring),[36] this raises questions as screening of loan applications and loan approval and follow-up are complex processes requiring specific training and inducing a risk for the bank. Delegating them to outside agents would certainly require a strict prior due diligence, sufficient training, and close monitoring and control.

Relevance of Setting up a Bank-Led Mobile Banking System

The cost of setting up mobile financial solutions and a network of agents from scratch is so high for a single bank that it might be profitable only for the largest ones.[37] For banks focusing on loans, the investment in such a system is probably not worth it, since only a minor part of the costs related to credit are significantly reduced by mobile banking systems. However, in the perspective of increasing deposits and savings and of developing the range of services, especially considering the high demand for payment and remittance services in rural areas, the investment becomes more attractive. Other considerations are factored in the decision of creating and managing a MB system, including impact on image and differentiation from competitors.

Thus, setting up a bank-led mobile banking system helps to make sure that such a system serves the bank's interests, but it is a very heavy initiative, which results at cost level in reduced transaction costs and increased production costs in a proportion depending on the environment. An idea is being tested to reduce the weight for smaller-sized banks: setting up mobile banking systems used jointly by several banks. These systems can either be centralized and imposed by the monetary authority[38] or set up by an individual service provider serving several banks.[39] This type of systems may allow banks to share costs and reach larger volumes while allowing a good adaptation of the system's functionality to financial services needs as they are designed to serve banks' needs in priority. The challenges they face are effectively serving different needs and priorities between different banks, it will be interesting to follow their effective set-up.

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[36] See Reserve Bank of India, *Discussion Paper on Engagement of 'for-profit' Companies as Business Correspondents*, http://www.rbi.org.in/scripts/bs_viewcontent.aspx?Id=2234, 2010.

[37] See Kumar et al., 2010.

[38] The eZwich smartcard-based system was launched by Bank of Ghana in 2008 and usage is compulsory for all banks including rural banks and savings and loans companies; the launch of the Maldives Monetary Authority Project supported by CGAP and World Bank is planned end 2010.

[39] The Senegalese Authorities are launching a phone-based mobile banking scheme aimed at increasing outreach of financial services in rural areas, open to all interested MFIs and banks, with the support of KfW.

4 Conclusions

4.1 Implications of Outsourcing on a Bank's Operations

From the Use of Third-Party Agents to Tellerless Banking: Impact on a Bank's Costs

A significant part of the costs of bank branches is related to cash management:

- Physical security infrastructure (safe and strongroom, guards, in some countries bullet-proof windows are also compulsory) as well as general office space for tellers;
- Processes reducing risks linked to cash transactions, which induce specific staff needs (separate teller and accountant, real-time entry in MIS, close supervision by branch manager, specific audit procedures);
- Costs linked to the necessity to maintain cash available;
- Periodic cash transportation;
- Support to illiterate clients for filling out forms.

Therefore, when complete outsourcing of cash transactions is possible, some banks have set-up tellerless offices whose roles are limited to managing the back-office (issue contracts, collection sheets), receiving clients (for loan applications, account opening, financial advice, signature of loan contracts, financial information, redress for errors) and hosting team meetings.[40] The reduction in production costs as compared to full-fledged branches makes it possible to set up such offices in areas that do not generate enough activity to support a full-fledged branch including cashier staff and equipment. An organization based on roaming officers will also be much easier to manage and control when officers do not have to handle cash. The idea here is not to work without branches but to work with an alternative type of network. Hence the term "tellerless banking."[41]

Thus, outsourcing cash transactions to external agents can completely change the costs of a bank's network by making it possible to use light offices or roaming officers instead of full-fledged branches, or to relieve roaming officers from cash management. This tellerless banking can make services sustainable in sparsely populated areas where a traditional organization could not cover its costs. The right combination of roaming officers, light retail outlets of different types, third-party agents, and ATMs will have to be determined based on the characteristics of each local market.[42] Convenience to the client is what grows the business.

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[40] This is the model set up by FIDES in FIDES Bank Namibia and planned in their Sénégal Project.

[41] Jean-Hubert Gallouet, HORUS-Development Finance, Vice-President.

[42] See Opportunity International's experience in Malawi (Campbell et al., 2008).

Impact of Outsourcing on Outreach

Outsourcing induces reduced transaction costs for cash transactions for both client and bank. Whereas we have seen that this is the major cost-driver for savings, deposits, payments and remittances, in the case of loans, cash transactions generate only a small part of a bank's transaction costs. Close interaction with LO is essential at all stages of the credit process: loan application assessment, regular monitoring during the loan, and contract enforcement in case of default. Therefore, outsourcing loan repayments to external agents requires reviewing the whole process.

Group lending technology in Kenya provides an interesting example: with external agents available anytime for repayment close to clients' homes, centralizing repayment through a group treasurer actually increases transaction costs for clients instead of reducing them as it used to (treasurer used to mutualism traveling and queuing-related costs). This had led SMEP and FAULU in Kenya to change the repayment process of their group-loans:

- from payment at group meetings in the presence of LO + group treasurer depositing the total repayment at a bank;
- to individual payments at MPESA + brief review at group meetings of the timely repayment of members from receipts.

In such cases where lending is based on group technology, the switch from loan repayment at group meetings to individual loan repayments at external agents needs to be carefully prepared to avoid it weakening repayment discipline. Both Faulu and SMEP had that experience at the beginning of their partnership with M-PESA. This has led other MFIs to use external repayment channels only for individual loans, as for example Tujijenge Tanzania.[43] Changing loan repayment channel thus needs to be carefully prepared in terms of impact on the MFI's processes.

Whereas in the Kenyan example clients used to be in charge of bringing the cash to a bank to repay their loans, in many cases it is the LO who collects the cash and brings it to the bank.[44] In these latter cases, it is not primarily the clients' transaction costs that repayment at agents will reduce but instead the bank's transaction costs. Although this might in the end also reduce the clients' transaction costs (reduction in time spent at group meetings, choice of time and place to repay), incentives will probably need to be provided to clients in such cases. Banks may then consider subsidizing the cost for their clients or lowering their interest rates to pass on part of the reduction in transaction costs to their clients.[45] The impact of the change on the client's transaction costs will thus determine whether a system can be changed easily or not.

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[43] See Kumar et al., 2010.

[44] This is the case of well-known Grameen Bank as well as CAURIE Microfinance in Senegal and SafeSave in Bangladesh, for example.

[45] See Kumar et al., 2010.

Thus, increase in outreach for lending services will require:

- either increased LO productivity, enabling one LO to reduce the time necessary for each interaction with his clients and thus to increase the number of loans in his portfolio; this is what Faulu and SMEP experienced in Kenya when outsourcing cash transactions but it very much depends on the previous organization of loan management;
- or an increase in the number of loan officers, enabling a branch to cover a larger area.

Thus, the scope of activities to be implemented by third-party agents should not be extended to loans without proper control mechanisms. When part of the loan process is to be outsourced, experience shows that the bank's organisation has to be reviewed in order to keep the close contact between client and LO that is necessary. Moreover, all of the implications of changing the cash-management network in an MFI need to be carefully thought out, especially regarding loan repayments, in order to avoid compromising portfolio quality.

Designing Products Differently: Impact on Quality of Service

By removing one of the major constraints to product design in rural areas, the feasibility of channeling cash to and from clients at reduced transaction costs opens the possibility of designing products differently: Both savings and credit products can involve more frequent transactions. Loan disbursement can be contemplated in tranches in order to better suit the calendar of the needs of clients[46] and also reduce unit amounts to put less strain on the cash available with rural agents. Indeed, product design needs to take into account the fact that the unit amount of transactions at an agent's shop will necessarily be capped, both for security and cash management reasons, caps being liable to differ between agents. Therefore agents can only be used for transactions with small enough unit amounts.

Outsourcing cash transactions to external agents thus opens the possibility of designing rural products differently.

4.2 When Should a Bank Contemplate Launching a Mobile Banking System?

Relevance of Mobile Banking Strategy

The mobile banking strategy is only one component of a bank's strategy to reach rural clients. Market needs have to be analyzed, and adapted products and processes have to be defined. As we have seen, whereas outsourcing cash transactions will be a very significant cost reduction mechanism for savings and deposits as

[46] This is particularly relevant for agricultural lending that should ideally reflect seasonalities of agricultural production.

well as for remittance and payment services, it is only a minor part of the costs of credit delivery. And simple SMS-banking is very adapted to improve communication between bank and client. Thus, depending on the bank's strategy for a given market, which itself depends on the unmet needs of this market, mobile banking might or might not be a good complement to increase outreach. In certain environments, "old-fashioned solutions" might be more relevant and successful. These have considerably gained in security from the introduction of ICT and are far from being obsolete. The mobile banking hype is thus definitely not a sufficient reason for engaging in such a heavy project.

To be profitable, a bank's mobile banking strategy needs to include a whole range of services addressing the needs of different market segments (not only those of the rural market). Mobile banking requires costly investments that need to be absorbed by a high volume of activity which can, depending on the context, be generated either by the sole bank with its whole customer base or by the use of a modularized system, based either on an external provider or on one set up by a group of banks.

In a given market a bank might need to offer a number of mobile-banking services, not necessarily the whole array (e.g. SMS-banking or account to account transfers), in order to just keep up with the market. This has to be analyzed on a case by case basis.

When considering technology-driven solutions, a bank should thus consider the type of services to be delivered to clients, model the solution's economy in the bank's given environment and make sure the necessary pre-conditions are in place. In a favorable environment, mobile banking can considerably help to extend the outreach of rural finance, but this requires to define at bank level (i) a comprehensive strategy to reach rural clients (including products, processes, etc.), and (ii) a mobile banking strategy (for both urban and rural areas).

Bank-Related Pre-conditions

A bank planning to use or set up a mobile banking system including provision of rural and agriculture loans will need to be already successfully offering financial services to rural/agricultural customers. Rural lending is a difficult field and mobile banking will not create the necessary skills.

Introducing mobile banking must be consistent with the bank's strategy and business plan. Financial projections must show sustainability of the project taking into account the following possible advantages:

- Reduce production costs per unit and/or transaction costs, at MFI and/or client levels;
- Reduce congestion in branches;
- Improve satisfaction and retain existing customers;
- Better face competition;

- Reach new customer segments or new geographic areas, at better conditions than those offered so far, including by the informal financial system;
- Marketing argument (build customer loyalty).

Environment Pre-conditions

Minimum regulatory conditions must be met, mainly permitting banks to engage third-party retail outlets with minimal financial risks for both banks and their customers, and tiered know-your-customer regulations in line with the possibilities of documentation of rural outlets for low-value transactions.[47]

Another critical element is the existence of potential agents: pre-existence of commercial networks is a favorable element and presence of potential agents of sufficient financial caliber in the region where mobile banking is contemplated is necessary. The bank needs to have a good understanding of the capacities and limits on the agent level.

4.3 The Role of Government and Donors

A positive role for the government is in creating an enabling environment, and in particular setting up adapted regulation enabling the use of technology and third-party agents while ensuring protection of consumers and of the financial system as a whole. Consumer protection is indeed a major concern to be addressed when regulated institutions outsource operations to non-regulated agents. Main related policy objectives are:

- Protecting client funds held as electronically stored value;
- Ensuring safety and reliability of services;
- Reducing opportunities for agent fraud and other harmful conduct;
- Ensuring clear and effective disclosure;
- Protecting clients' personal information;
- Ensuring clients have knowledge of and access to effective redress and complaint procedures.[48]

Donors and development finance institutions (DFIs) have an important advocacy role by engaging in a dialogue with governments on conducive policies and frameworks for expanding financial services through use of third-party agents, and by facilitating exchange and learning on lessons and good practices.

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[47] See Alexandre et al., 2010.

[48] See Denise Dias and Katharine McKee, "Protecting Branchless Banking Consumers: Policy Objectives and Regulatory Options", CGAP Focus Note No. 64, 2010.

- Using technology for expanding outreach in rural areas is a new field presenting high risk and uncertainties for banks. In this context, it also makes sense for donors to support pilot projects that can build reference for future replication. In a context where mobile-banking is very much in fashion, an important contribution donors can make to its healthy development is helping banks gain a comprehensive understanding of stakes and issues.

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CHAPTER 11

Tameer Bank's Experiences with Mobile Banking

Shahid Mustafa[1]

Although Pakistan has several dynamic metropolitan centers, the majority of the population lives in rural areas, much of it far away from urban settlements. The rural population, predominantly poor, is widely unserved by the formal financial sector. This article explores how Tameer Bank aims to serve the rural poor by employing modern communication technologies: The mobile phone is the cornerstone of Tameer Bank's approach to outreach into the countryside.

1 Access to Finance: The Case of Pakistan

The population of Pakistan is about 175 million, making it the sixth most populous country in the world. The rural population is almost 64 percent of the total population.

However, historically, the rural sector has suffered from policy neglect and the weak implementation of delivery systems for financial services. The services provided have been inadequate, inconvenient, and unaffordable. In relative terms, most attention has been paid to the provision of agricultural credit and the mobilization of deposits from wealthy people in rural areas. The provision of insurance, credit for non-farm purposes and for the landless and small farmers, and the mobilization of savings of the poor and the poorest in rural areas have not received much attention from policymakers. The lack of appropriate saving products, the almost total absence of insurance, limited access to credit for the poor and rural, non-farm activities, and an inefficient payments system has deprived rural people of productive employment, as well as high and broadband growth. As a consequence, the rural economy is mired in a vicious circle of low growth, low productivity, low savings, weak employment generation, and rising poverty.[2]

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1 Tameer Bank.

2 State Bank of Pakistan. Excerpts from the report of the Committee on Rural Finance.

D. Köhn (ed.), *Finance for Food: Towards New Agricultural and Rural Finance*,
DOI 10.1007/978-3-642-54034-9_11, © The Author(s) 2014

As depicted in Figure 1 and Figure 2, the average Pakistani household remains outside the formal financial system, saving at home and borrowing from family or friends. Fourteen percent of Pakistanis use a financial product or service of a formal financial institution (including savings, credit, insurance, payments, remittance services). When informal financial access is taken into account, 50.5 percent of Pakistanis have access to finance. Informal access can occur through the organized sector (though committees, shopkeepers, moneylenders, hawala/hundi money transfers, and so forth), or informally through friends and family. In comparison, 32 percent of the population has access to the formal financial system in Bangladesh; this figure is 48 percent in India and 59 percent in Sri Lanka.[3]

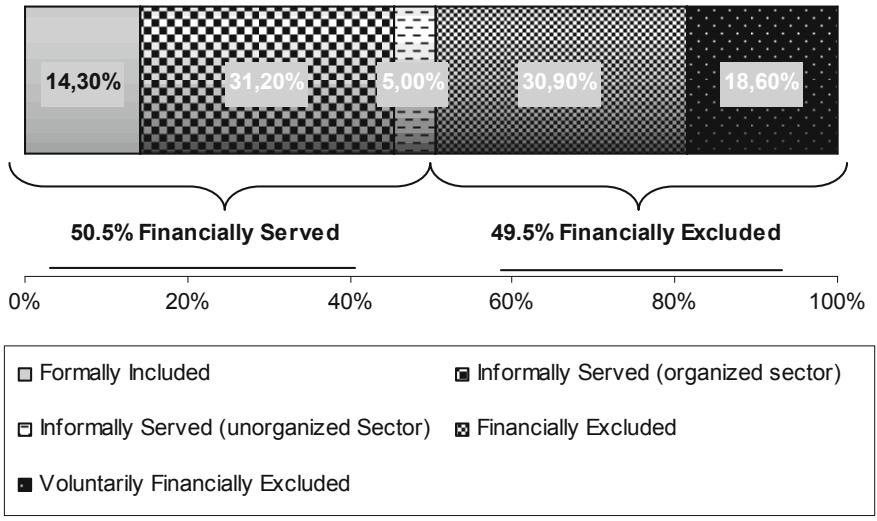
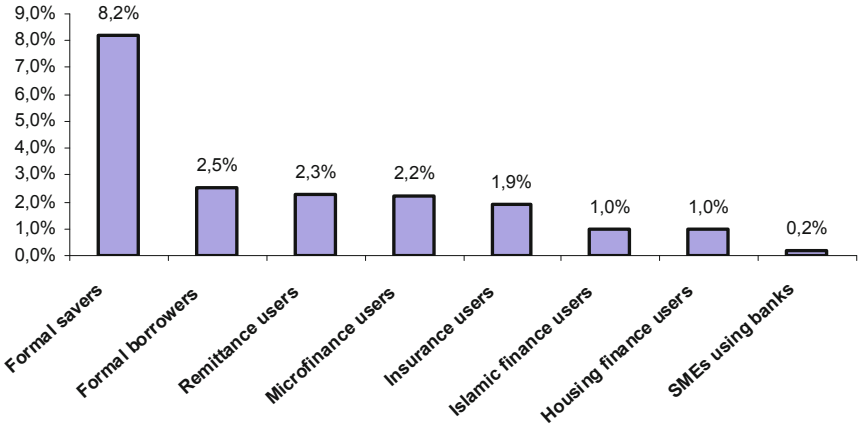


Fig. 1. Financial Inclusion Scene in Pakistan[4]

Financial access is low among the poorer, women, small and microenterprises, and in rural areas. Yet market studies suggest they are viable customers. Most formal financial products remain high-end, limited to urban, rich, educated males employed in the formal sector. The formal sector could learn a lot from and partner with informal providers; their services are perceived as being more geographically accessible, less complex, having fewer requirements, and being easier to understand.

[3] T. Nenova, C.T. Niang, and A. Ahmed, "Bringing Finance to Pakistan's Poor: A Study on Access to Finance for the Undeserved and Small Enterprises", May 2009.

[4] Ibid.



- Over half of the population saves, but only 8 percent entrust their money to formal financial institutions.
- One-third of the population borrows, but only 3 percent use formal financial institutions to do so.
- Microfinance has grown at 40 percent per year since 1999 – ***yet*** microfinance access extends to only 1.7 million out of an adult population of about 80 million.
- International remittances have grown at 29 percent since 2001 – ***yet*** only 2.3 percent of Pakistanis send or receive remittances, while half of remittances, including domestic flows, are transmitted informally.
- Agricultural disbursement grew by 44 percent in 2003-07 – ***yet*** rural credit demand remains unmet – the financial system reaches only 15 percent of the farmers.
- Life insurance is the most used insurance product, and demand is high for drop insurance – ***yet*** only 1.9 percent are insured

Fig. 2. Financial Services – Demand and Supply[5]

2 Mobile Penetration: Anywhere and Everywhere

Pakistan is among the five most dynamic economies of developing Asia in terms of the penetration of mobile phones. While looking at regional mobile penetration, Pakistan is far ahead of many Asian countries. Because of consistent and unwavering growth patterns (Figure 3), Pakistan's mobile industry has reached the landmark of 100 million subscribers in July 2010. Mobile penetration in Pakistan has been increasing at a very high pace and it stands at 60.4 percent, showing a cumulative average growth of 5 percent in the last three years. The mobile operators have been aggressively working on increasing their networks, especially to unserved areas. During the fiscal year (FY) 2009–2010, cellular mobile subscriber showed a growth of 5.1 percent as compared to 2008–2009 when the total subscribers stood at 94.3 million and growth was over 7 percent. Even though the sector has been showing signs of slow down since 2010, growth has remained positive. The increasing

[5] Ibid.

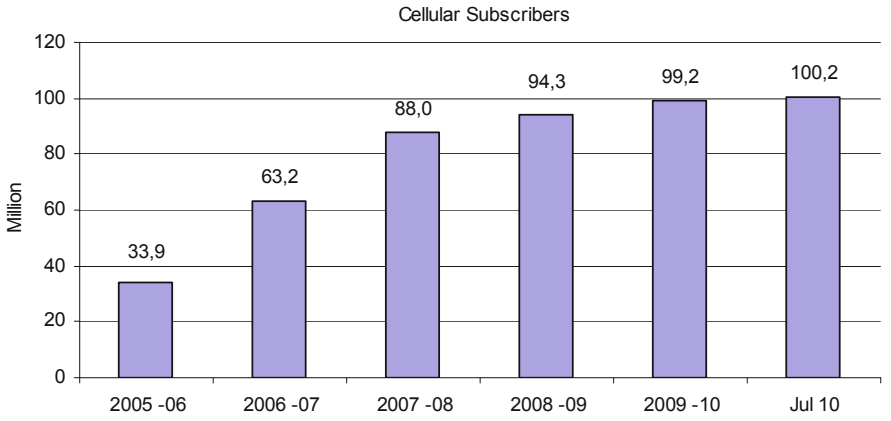


Fig. 3. Cellular Subscription in Pakistan[6]

coverage area serves as a key to expanding the subscriber base. At present, there are 30,126 cell phone towers erected by all operators combined across Pakistan.[7]

3 Mobile Banking: Differentiated and Low Cost

To serve poor and largely unbanked potential customers, a distribution strategy exclusively incorporating traditional brick-and-mortar model is time consuming for the clients, and at times, not financially viable for the bank as the costs attached to it can be prohibitive. The barriers facing branch-based models that can be overcome with branchless banking are shown in Figure 4.[8]

Technology can lower costs, enlarge geographical reach, increase product quality, help enhance credit information, and provide innovative applications for service delivery. There exist large segments of 'unbanked' people and those who are informally served by either organized or unorganized sector. At the same time, the mobile penetration and subscriptions and complementing Telco agent network servicing those customers have reached new heights. Given these occurrences, mobile banking turns out to be the solution and catalyst to promote financial inclusion in rural Pakistan.

6 Ibid.

7 Pakistan Telecommunication Authority, Annual Report 2009–2010.

8 Internal Tameer presentation.

	Branch based models face the following barriers…	…Which can be overcome with branchless banking
Physical infrastructure	**Cost is high to set up branch and ATM network and associated connectivity** • Not economical to expand outreach to low density areas, especially for non-credit products **Response to market opportunities is low** • Speed of branch expansion is limited by need to find and train staff and obtain premises	**Branchless banking is low cost as it leverages existing infrastructure** **Expansion is limited only by number of agents that can be signed up to act as channels for the bank and mobile network coverage**
Image	**Banks are seen as formal institutions meant only for "rich people"** • Bank staff is not trained to serve "poor" customers **Cultural barriers restrict women from access** • Women visiting banks are frowned upon in conservative parts of the country	**Low psychological barriers to access** • Customers typically already have existing interaction with agents (e.g., shopkeepers, post offices) • Mobile banking enables women to transact with minimal physical interaction with society
Requirements and restrictions	**Large amount of paperwork and requirements to be fulfilled to become a customer** **High fees and charges** • Banks need to impose service charges, minimum balance or minimum opening amounts to cover their high fixed costs	**Reduced KYC requirements for branchless banking accounts** **Lower fees and charges** • Branchless banking model will be able to offer more competitive rates due to lower fixed costs

Fig. 4. Branchless banking – benefits offered

4 Tameer-Telenor Partnership

Tameer Bank was conceived and established in 2005 by a group of former executives from Citibank. The following market dynamics led to the idea of creating a new microfinance bank in the country:

- Largest untapped customer segment with multiple needs (cradle to coffin);
- Traditional microfinance was unable to achieve scale and no dominant player was present;
- Commercial banks had tried to move up the financial pyramid, i.e. concentrating on the upper and middle class, which worsened the access to finance for the vast majority;
- Enhancing financial inclusion and literacy could reap rich dividends in terms of economic improvement and resultant social impact.

Tameer envisions emerging as a global benchmark for innovative and commercially viable microfinance solutions for unbanked peoples' socio-economic empowerment. Tameer strives to set new standards of excellence in value-added microfinance and related services through innovative technology and a highly skilled/professional staff for customer convenience and satisfaction. Five years after its launch, Tameer provides services in three provinces of Pakistan and has over 100 outlets based on a spoke-hub distribution paradigm, comprising branches as hub and sales centers and community centers as spokes.

In 2008, with the bank on solid footing, it became apparent that the costs of rolling out a sufficient number of branches to serve the market would undercut their financial viability. To serve these relatively poor, unbanked potential customers, Tameer had to reach even further into the rural areas where these people lived. Even with a hub-and-spoke strategy incorporating low cost sales/service centers and lower cost community centers, the personnel costs were prohibitive.

While ATMs and point-of-sale (POS) devices had already extended financial services beyond the walls of bank branches, Tameer's vision was much more expansive. Tameer saw beyond the debit card payment for purchases at retail store POS devices and the withdrawal of money from urban ATM machines to a network of authorized bank "agents" in small stores throughout the country equipped with mobile phones with which they could access the bank platform. These agents, who already had viable businesses, would be capable of opening bank accounts and providing a full range of financial services far beyond the reach of traditional banking facilities. The confluence of this technological alternative and Tameer's need for lower cost access to customers caused the bank to begin an exploration for partners who could provide both a technological solution and the necessary agent network.

As Tameer was beginning operations in 2005, the giant Norwegian telecommunications company, Telenor, was also establishing itself in Pakistan. Though Telenor was committed to investing fully in becoming a major competitor in the mobile phone market in Pakistan, Telenor recognized the steady erosion of telecom revenues throughout the world as the mobile phone business became increasingly competitive. Telenor Group management saw financial services as a growing opportunity to reach the huge numbers of potential customers in the unserved lower segments of the retail banking market, especially in developing countries. Grameenphone, another company in the Telenor Group, had already launched a branchless banking service in Bangladesh in 2007. To pursue the opportunities in financial services across its operations in 14 countries, Telenor Group established a separate organizational unit to drive strategies and support initiatives for each of the operation companies in the Telenor Group.

Telenor recognized that the State Bank of Pakistan (SBP) was determined to implement a "bank-led" model, restricting branchless banking services to regulated financial institutions. This meant that if Telenor was to enter the financial services business in a way that exploited its vast airtime sales agent network, it would need a bank as a partner. In November 2008, after five months of negotiations, Telenor purchased a 51 percent controlling interest in Tameer, and Easy-

Paisa was born. EasyPaisa is a branchless banking service offering convenient access to financial services. As the brand suggests, it promises to provide the customers with complete convenience and empowerment. This service is not just limited to Telenor subscribers but also to those who use other carriers or even do not use a mobile phone at all. It offers a hassle-free way of conducting financial transactions – be it utility bills payment, mobile account, domestic remittance, or even international remittance. The offering will be further enhanced by adding life and health insurance deals, saving products, loan disbursement and repayments (for Tameer Bank customers), and donations.

This win-win deal for both Telenor and Tameer is depicted in Figure 5.

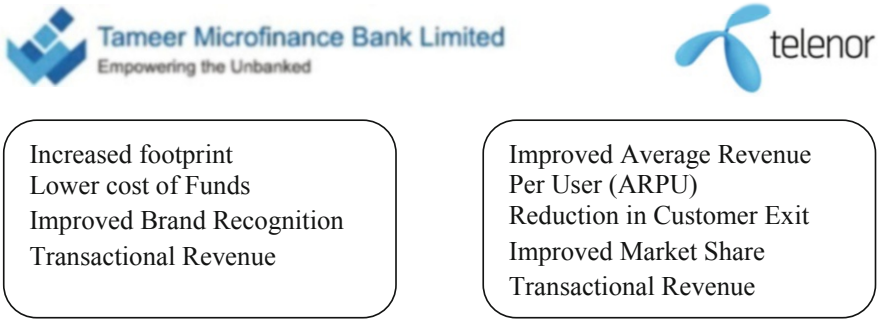


Fig. 5. Telenor and Tameer – Partnership Advantages

EasyPaisa Team. There were not two specific entities launching this service: It was one large team with distinct responsibilities assigned to each partner based on the partner best positioned to execute. Within the joint product team, there was everything you would expect: product management, operations, marketing, legal, technology, etc., with staff from both organizations.

From a legal perspective, Tameer has a relationship that entails an agency agreement whereby Telenor is acting as a distribution arm for branchless banking. Anything that relates to demand liabilities rests with the bank: the balance sheet used is the bank's, so all customer balances appear there. Beyond the legal architecture, there is also a logical assignment of responsibilities within the project to staff from Telenor and Tameer. The entire channel management and retail set-up work is done by Telenor, given its immense expertise in this core line of work. It also hosts the technology and operates a call centre that provides customer service and complaint handling. Concept development is done in partnership, but Telenor takes the lead on marketing, including working with creative agencies and purchasing media. Tameer is responsible for operating accounts, creating ledgers, reconciliation, fund settlement, fund settlement with external parties, risk and compliance, and fraud investigations. These are all core banking functions that Tameer is best positioned to deliver.

5 EasyPaisa: Story So Far and Way Ahead

Using the cell phones and agent network, EasyPaisa aims to bring efficient, instant, highly secure financial products like mobile accounts which offer, domestic remittances, utility bill payments, agent based cash deposit and withdrawal services and merchant development as value added service to complete the low end retail mobile commerce initiative.

Actual scope and sequence of products planned by the EasyPaisa team was a key difference between the various mobile money initiatives in other countries. M-PESA (introduced by the telecom provider Safaricom in Kenya) had been launched with the tag-line "Send Money Home," focusing on money transfers. Another East African multi-national company, Zain, launched "Zap" in February 2009 and launched all of its multiple services together.

The EasyPaisa team decided initially to focus on four products, rolling them out one at a time in the following sequence:

1. Bill payments;
2. Money transfers;
3. Mobile account;
4. International remittances.

Establishing viable distribution through their agents was a primary concern. Bill payment was a known service and there where bottlenecks. However rural populations seemed to have less access to alternative bill payment facilities and stood in long lines outside banks for a large part of the day for this. Allowing payment at one's local store was expected to greatly improve convenience for the target segment.

EasyPaisa was launched publicly on 15 October 2009 with a massive media campaign. Though the long-term strategic advantage of branchless banking was predicated on the use of mobile phones for financial transactions, the first service offered was traditional over-the-counter (OTC) utility bill payment at specially trained Telenor retailers. The intention was two-fold. First, EasyPaisa management wanted the retail agents to become accustomed to financial transactions before launching the mobile channel. And second, they wanted to begin with simple products/services that people needed and could easily understand. But EasyPaisa management also believed that for people already familiar with electronic top-up for phone service adopting financial services was only a small step. Telenor management was confident in their ability to train customers to use financial services just as they had trained them to use phones.

Transactions can be conducted at a variety of EasyPaisa outlets including Telenor sales and service centers, Telenor franchises, retail outlets, Tameer branches, and Tameer sales and service centers. It is intended to have a total of over 20,000 merchant agents by the end of 2011, outnumbering the total number of bank branches

and post offices in the country. Customers using these agent outlets are not required to be Telenor phone customers. The over-the-counter service at all locations is available for all people of Pakistan. It is only for signing up for mobile accounts and performing the service on the phone, the customer need to have a Telenor SIM.[9]

EasyPaisa has experienced rapid growth after successful early adoption of its OTC bill payment and domestic remittance products, indicating strong latent demand for e-payment services in Pakistan:

- The number of transactions grew from 49,000 in October 2009 to 1.6 million in January 2011, a cumulative average growth rate (CAGR) of 26.2 percent per month. Since May 2010, this growth has accelerated with transactions quintupling within eight months;
- The value of transactions has grown from PKR 61 million ($0.7 million) in October 2009 to PKR 2.7 billion ($32 million) in January 2011, a CAGR of 29 percent per month. This testifies to the rapidly growing ability of EasyPaisa merchants to handle cash in addition to increasing customer trust in EasyPaisa services. The value of transactions has quadrupled over the last eight months;
- In January 2011, more than 52,000 transactions per day were successfully carried out with average daily throughput of more than PKR 88 million ($1 million). This amounted to approximately 1.62 million transactions a month with total throughput of more than PKR 2.7 billion ($32 million);
- The EasyPaisa distribution network has grown from 2,200 merchants at the time of launch to 11,000 merchants today spread across 700 cities, towns, and villages of Pakistan. The growth in this distribution network has made EasyPaisa's reach larger than the combined reach of all banks in Pakistan. There are around 8,500 bank branches in the country;
- Approximately 33 percent of all transactions have a rural/semi-urban origin which highlights EasyPaisa's growing penetration in rural/semi-urban areas. This is particularly important as the rural/semi-urban penetration of formal financial services in Pakistan is very low;
- Among the products, utility bill payment and money transfer have shown significant growth through OTC channel during the first year of EasyPaisa operations. Utility bill payment has grown from 48,000 transactions/month to one million transactions/month, a compound annual growth rate (CAGR) of 22.6 percent;

[9] A Subscriber Identity Module (SIM) is a chip card inserted into a mobile phone. It allows for the identification of the user in the network. With a SIM mobile phone, operators provide phone connections.

- Money transfer has been the most promising product of the EasyPaisa portfolio with transactions growing from 6,000 in November 2009 to 424,000 in January 2011, a CAGR of 34.8 percent;
- The results of a profiling study of money transfer reveal that 47 percent of the customers belong to the lowest socioeconomic classes. Furthermore, 40 percent of customers have not completed ten years of education. Most importantly, 42 percent of customers are blue-collar or skilled workers, while military personnel, farmers, and self-employed people are also represented. We should also note that many of EasyPaisa's earliest adopters were urban customers who needed to remit money and/or pay bills. As remittance receivers join the system and as the merchant network reaches into poorer and rural areas, we expect the percentage of EasyPaisa customers who are poor or very poor to increase over time.

The phenomenal success of EasyPaisa has shifted the paradigm and prompted competitors to follow suit. Being viable, scalable, and efficient, the model has the potential to bridge the gap between the haves and the have-nots.

Lack of formal financial services in rural domains, and exponential penetration of mobile phones and agent networks provide a opportunity for mobile banking to step in and bridge the gap. EasyPaisa envisions becoming the first choice for the unbanked and rural populations. The market potential is huge and still largely unserved. Given the diversity of financial needs, there will be products added to the suite that cover loan disbursals, loan repayments, health insurance, and small savings.

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CHAPTER 12

Poverty-Sensitive Scorecards to Prioritize Lending and Grant Allocation with an Application in Central America

Manuel A. Hernandez[1] *and Máximo Torero*[2]

1 Introduction

The importance of credit access in improving economic opportunities in developing markets is well established and generally recognized by policymakers. The optimal use of loan funds, however, could be subject to a potential tradeoff between sustainability and poverty reduction. This chapter develops a poverty-sensitive scorecard system for lending or grant allocation in underdeveloped markets. The methodology is innovative in that it combines both a risk and a poverty scorecard. This ensures that the loan or grant allocation is not only focused on targeting the poor, but also on ensuring the sustainability of the investment project. In addition, the risk scoring uses an innovative non-linear and nonparametric model that leads to better assessment of credit worthiness and results in a lower screening of the poor from this extremely important market. We then implement the scorecard system using a real example of grant competition in Central America to link rural smallholders to markets.

The importance of credit in improving economic opportunities in developing markets is well documented (Armendariz de Aghion and Morduch 2005; Shahidur, 2006; Brett, 2006, Gosh, Mookherjee and Ray, 2000). Similarly, the role of micro- and small enterprises in economic development has been recognized by policymakers since the 1970s when the overwhelming patronage of large-scale industries did not bring redistribution with growth (McPherson, 1996). Promotion of small enterprises requires a leveling of the playing field between the large-scale sector and the small-scale sector. One way to do so is to design policies that do not explicitly or implicitly discriminate against the small-scale sector. Policies that assist small enterprises may also be desirable. Measures to assist small enterprises

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have included training in production and marketing methods, as well as measures to make credit available to them.[3] Apart from priority and subsidized lending, financial assistance can be provided by donors in the form of grants.

In lending or extending grants to small enterprises, the choice of projects among competing demanders is important. In underdeveloped markets where contracts are difficult to enforce and the problem of adverse selection (wrong choices made when the type of borrower is unknown) is severe, lending risks are high. Traditionally, credit in these sectors has been characterized by money lenders offering loans with relatively high interest rates. The credit from government banks to the majority of poor borrowers has been restricted due to stringent collateral demands. One form in which formal credit to the poor has expanded is through microfinance. This type of lending is targeted to self-employment activities without accompanying collateral. It is well known that the absence of collaterals can lead to credit market failure (Ghatak, and W. Guinnane, 1999) when a loan is granted to individuals rather than groups.

Most of microfinance credit is extended based on the reputation of the borrower (for example his/her past borrowing and repayment pattern). As reputation is difficult to measure, the lack of a more precise measure of borrower's riskiness affects the efficiency of the credit market. Thus, in spite of the well-publicized success stories in microfinance credit, there have been concerns that the lending institutions have been able to sustain low rates of interest and relatively high default rates mainly due to subsidies and soft loans. For example, Grameen Bank charges an average real rate of 10 percent, and has experienced losses close to 18 percent of outstanding loans over the period 1985–1996 if proper adjustment for the portfolio size is taken into account (Armendaris de Aghion and Morduch, 2005).

Banks face greater difficulty in overcoming adverse selection problems in individual lending. A credit scorecard that predicts credit worthiness of the borrower accurately can address the problem of market failure to a large extent. With a credit score, lending institutions will also be able to offer a menu of choices combining interest rates and approved loan amount for a potential borrower. The fundamental element in producing such a menu is the creation of an accurate risk ranking (hitherto missing in case of most lending to the poor including in microfinance credit) for individual borrower units based on some specific attributes. Credit scoring models have been shown to be the most effective tool in determining the riskiness of a borrower and are usually based on long historical data involving several entities (for example, an integrated system of lending institutions).

However, the riskiness of a borrower (in terms of the chance of default on repayment for loans and in terms of the efficient and adequate use of funds for grants) is not the only criterion that should be used in the case of development

[3] The vast majority of these credit programs, especially the so-called "agricultural development banks", which provided credit at subsidized interest rates, have failed to achieve their objectives both to serve the rural poor and be sustainable credit institutions (Adams, Graham, and von Pischke, 1984; Braverman and Guasch, 1986; Adams and Vogel, 1986).

lending. The menu of projects should also be assessed in terms of their potential for reducing poverty. Consequently, the optimal use of loan funds could be subject to a potential tradeoff between sustainability and poverty reduction.

This chapter develops a poverty-sensitive scorecard system for lending or grant allocation in underdeveloped markets, which addresses the question of how to lend or provide grants when faced with the above-mentioned tradeoff. The proposed methodology consists of two stages. The first accounts for the development of a risk scorecard – a risk score – for potential borrowers using the latest developments in econometric modeling. The nonparametric technique we propose will allow risk ranking through credit scores that significantly improve upon current methods by providing a more accurate measure of risk associated with individual loans, and more importantly, provide a more accurate measurement of potential gains and losses associated with each loan. In the second stage, following a Principal Components approach, a poverty scorecard is developed to evaluate the projects of potential borrowers who have a risk score below a certain threshold. That is, projects that are proven to be sustainable in the first stage are ranked in the second stage in terms of their potential impact on poverty reduction.

The remainder of the chapter is organized as follows. Section 2 discusses the proposed risk and poverty scorecards in detail, including the methodology used to develop and implement them. In Section 3, we apply the poverty scorecard system to a real example of grant competition in Central America to link rural smallholders to markets. Section 4 provides concluding remarks.

2 Building a Scorecard

The scorecard system proposed for lending or grant allocation (extension) in developing markets consists of two stages. In the first stage, a risk scorecard or algorithm suitable for lending to small enterprises is constructed and applied using the latest developments in statistical (econometric) modeling. In the second stage, the projects of potential borrowers (beneficiaries) with a risk score below a particular threshold are evaluated in terms of their potential impact on poverty reduction through a poverty scorecard. The process involving the two stages is summarized in Figures 1 and 2.

The conceptual framework behind the proposed risk and poverty scorecard system rests both on targeting the poor and on assuring sustainability of the project. With the premise that sustainability is a necessary condition for poverty reduction, in stage 1, a loan/grant application is evaluated in terms of the borrower's default probability. Similar to the default likelihood in lending markets, which is usually captured through a credit scorecard, a risk score or default probability can be computed using information from the loan/grant applications as well as information from other sources.

Note that the interpretation of default differs for a loan and a grant. In the case of a loan, default is to be interpreted as an event in which the loan is not repaid in time.

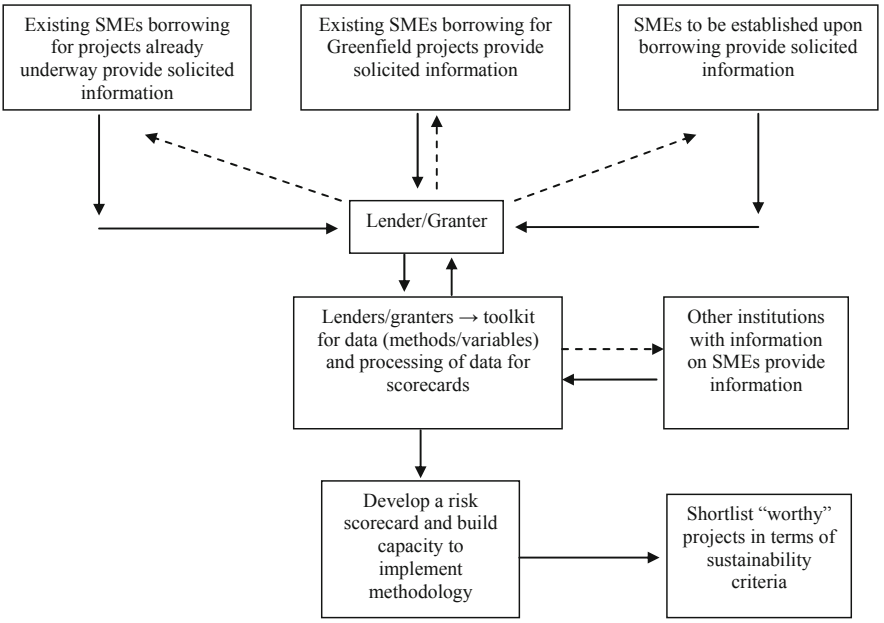

Fig. 1. Stage 1: Creating the Sustainability Cut-off Using a Risk Scorecard

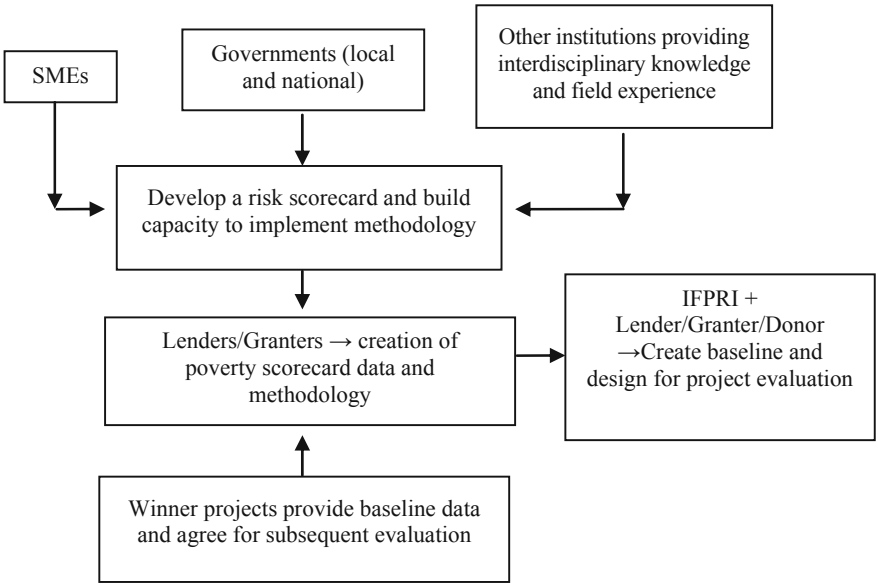

Fig. 2. Stage 2: Creating a Poverty Scorecard among Short-Listed Projects

In the case of a grant, where there is no repayment obligation, the sustainability of the project needs to be assessed in terms of alternative indicators. Thus, in the case of loans, a standard credit scorecard framework can be applied, while in the case of grants, estimating a survival probability or the probability of returns beyond a threshold could be assessed using data from a reference or a comparable group of enterprises.

Information from several sources can then be combined to estimate default probability for the loan/grant applications. Some data can be collected in conjunction with the loan/grant application. However, data regarding transactions of the applicant with other institutions, data regarding external factors that can affect the profitability/viability of the enterprise/project, and data from comparable enterprises are essential for improving the predictive power of the scoring model. After selecting those projects with a minimum risk level to assure their sustainability, these projects are then evaluated in terms of their potential impact on poverty.

It is worth noting that the creation of a scorecard system is a dynamic process that can be improved over time, particularly when there is initially limited information for risk assessment (see Figure 3). An initial risk algorithm can be derived based on the performance of comparable enterprises/borrowers. This algorithm can then be applied to evaluate the loan/grant applications of interest, using the information collected during the application process as well as information from other sources. The outcomes of the projects that were selected based on their risk score and potential impact on poverty reduction can then be further evaluated, which will help to expand and update the data for the scorecard system. Thus, an interim scorecard can be created (most likely through a pilot intervention) that not only exploits existing information but also incorporates additional incoming information to improve the scorecard. This process can continue until a performance history is established for a reasonably large portfolio of loans/grants.

Next, we discuss in more detail the methodology used to develop and implement the risk and poverty scorecards.

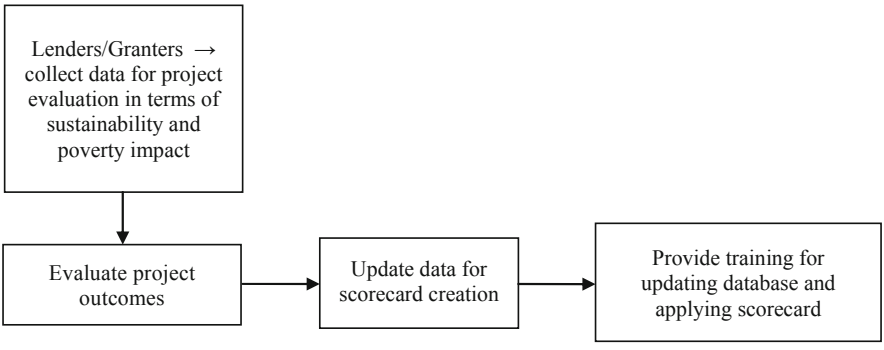

Fig. 3. Evaluation of Project and Strengthening of Database and Scorecard

2.1 Risk Scorecard

In well-developed credit markets, the use of credit scores is an integral part of the lending process. The increase in the use of credit scoring systems in developing economies, in contrast, is a relatively recent phenomenon. We intend to develop a credit scoring system for lending or extending grants to small enterprises that employs the latest developments in statistical (econometric) modeling, which are likely to improve the accuracy of risk ranking compared to existing methods. In particular, our objective is to develop a credit scoring algorithm suitable for lending to small and micro-enterprises and to provide the guidelines needed to generate a working database on credit scores based on available data and on potential data that can be collected in the future to improve the model prediction. It is also our intention to make the credit scoring mechanism simple to apply.

The development of a robust system of risk scoring will benefit both the lender/granter and the borrowers. The absence of a well-developed risk scoring system not only restricts access to credit but also prevents the development of differentiated borrowing options. Given a credit score, lending institutions are able to offer a menu of choices combining interest rates and (pre-approved) loan amounts for a potential borrower.[4] The fundamental element in producing such a menu is the creation of an accurate risk ranking (which has been missing until now in the case of most lending to micro- and small enterprises), but the accuracy of this ranking mainly depends on the statistical model used to construct it. We propose a model that more accurately reflects the relationship between a borrower's characteristics and risk level.

As noted above, detailed information regarding both a borrower's specific characteristics and external factors plays a crucial role in building the risk-based scorecard. However, in developing countries, detailed information regarding these variables is generally not available; thus, loans/grants are sometimes granted by qualitative/subjective evaluation. The methodology proposed below is also applicable when there is initially limited information. New information can then be incorporated across time to improve the scorecard.

Methodology

Associated with every potential borrower, there is a probability of default conditional on the terms of the loan/grant being requested. This probability depends on a borrower's attributes as well as on external factors that are not borrower-specific. The main purpose of a scorecard is to create a ranking of borrowers by estimating these probabilities, recognizing that their magnitudes depend on several borrower attributes and factors. For example, consider a loan request from a small enterprise

[4] Risk scoring is not necessarily an instrument used to discriminate against high risk, but an important tool in designing the portfolio of borrowing options. Hence, the term of loans/grants or the interest rates offered will tend to be sensitive to the type of borrower.

closely related to the agricultural sector. The borrower's characteristics may include current assets, income, credit history, and outstanding debt, while external factors may include crop price volatility. In general, estimation is conducted by relating a discrete (binary) variable to a borrower's characteristics and to external factors.

A suitable statistical model (regression) should be an accurate representation of the underlying relationship between attributes, external factors, and the defined binary variable. The statistical model used belongs to a class of discrete choice models in which the odds of a loan being of high (or low) risk is a function of borrower-specific characteristics and other attributes. The specific assumption about the functional form for this relationship becomes crucial for classifying the borrowers into risk categories. Depending upon whether the chosen functional form is correct or not, the accuracy of the model predictions is likely to vary significantly. It is also worth noting that functional assumptions imposed in the development of credit scores in developed countries is often of limited use in credit markets in developing countries, since key variables that affect the riskiness of borrowers, and the way in which they affect the level of riskiness, vary significantly between developed and developing economies.[5] It is useful for developing countries to develop a methodology that does not depend on prior knowledge or particular assumptions on functional forms.

The specific methodological innovation that we propose consists of not assuming a specific functional and distributional form in the relationship between borrowers' characteristics, external factors, and the default probability. Allowing the data to fit in the best functional form is preferable to imposing specific (and most likely erroneous) functional and/or distributional assumptions. Statistical models in which specific functional forms are not imposed are known as semi-parametric and nonparametric estimation methods. Although very well suited for credit scoring research, these methods have surprisingly not been widely applied in this area. A plausible explanation for this lies in the fact that most implementable semi-parametric and nonparametric methods have been recently developed.

A simple example can illustrate the problem of assuming a specific functional form that happens to not be the correct one. Let the default probability of a borrower depend on the loan amount, debt ratio, and asset size. To demonstrate the utility of a data-driven method, assume that there exists an unknown threshold asset size below which the default probabilities rise exponentially. For asset sizes above the threshold level, the default probabilities do not depend on asset size. The standard scoring models assume that the odds of default are linear with respect to all explanatory variables and that the underlying distribution governing the relationship between the probability of default and the explanatory variables is known. The use of these methods will incorrectly estimate the risk of default for

[5] For example, it is well established that the loan-to-collateral ratio and payment burden are significant contributing factors in risk assessment. However, in agriculture-based lending, price volatility and probability of crop failure will play a much bigger role in risk ranking.

borrowers with asset holdings below the threshold level. This may lead to the potential exclusion of "good" borrowers from the market.

The specific econometric method that we propose for estimating risk scores is the semi-parametric single index model derived by Klein and Spady (1993) because of its relatively faster and less computational burden estimation process, compared to a fully nonparametric method. Recall that we are also looking for a method that can be easily implemented. Compared to a parametric method, the semi-parametric single index model does not impose a specific distributional form when modeling the probability of default. In particular, the probability of default is given by,

$$P(Y=1 \mid X) = E(Y \mid X) = g(X'\beta)\,, \tag{1}$$

where Y is the binary variable associated with the default of past projects/loans, X is the set of socioeconomic and financial characteristics of the borrower, plus other factors that could affect the likelihood of default, $g(\cdot)$ is an unknown function, and β is the set of parameters to be estimated. This model is semi-parametric in nature since the functional form of the linear index is specified, while $g(\cdot)$ is left unspecified. In a parametric setting, $g(\cdot)$ could be assumed, for example, to be a Normal function, which would result in the widely used Probit model.

Klein and Spady suggest a semi-parametric likelihood approach to obtain parameters β from (1). More specifically, the maximum likelihood estimator of β is given by,

$$\hat{\beta} = \arg\max_{\beta} L_n(\beta, g) = \sum_{i=1}^{n} (y_i \ln g(X_i'\beta) + (1-y_i)\ln(1-g(X_i'\beta)))\,, \tag{2}$$

where $g(\cdot)$ is approximated for each borrower/applicant i through a leave-one-out nonparametric kernel estimator, such that

$$\hat{g}_{-i}(X_i'\beta) = \frac{\sum_{j\neq i} k\left(\frac{\left(X_j - X_i\right)'\beta}{h}\right) y_i}{\sum_{j\neq i} k\left(\frac{\left(X_j - X_i\right)'\beta}{h}\right)}\,. \tag{3}$$

The risk score estimated for each potential borrower or grantee i is, then, the estimated $\hat{g}_{-i}$ using $\hat{\beta}$.[6]

[6] Single index models also require two identification conditions under which the unknown parameter vector β and the unknown function $g(\cdot)$ can be sensibly estimated.

Steps to Construct a Risk Scorecard

Given a pool of potential borrowers or grantees, the steps to derive a risk score can be summarized as follows:

1. Gather information from past loans (grants) from the same pool of borrowers (grantees) and/or from other comparable sets of loans (grants) from applicants similar to the pool of borrowers (grantees). The information collected should allow us to determine/identify the performance of those borrowers/grantees (default or sustainability of their project). The information should also include (at least) socioeconomic and financial characteristics of the applicants.

2. Estimate the performance of these previous borrowers/grantees as a function of their socioeconomic and financial characteristics and other related factors (if available) using the semi-parametric single index model described above.

3. The resulting estimated vector of parameters $\hat{\beta}$ from step 2 can, then, be used in (3) to derive a risk score for the interested pool of borrowers or grantees. We only need to provide the same set of characteristics and factors used in the estimation of β for the pool of potential borrowers/grantees to be evaluated.

4. Only those projects (borrowers/grantees) with a risk score below a certain threshold will then be assessed in terms of their potential impact on poverty.

Note that this risk scoring mechanism could operate through a simple implementable program in open-source software, such as a spreadsheet. The estimated vector of parameters $\hat{\beta}$ from step 2, and the procedure to obtain $\hat{g}_{-i}$, described in equation (3), can be embedded in the program; the user will then only need to provide the set of characteristics contained in X for the potential borrower/grantee(s) to be evaluated. However, given that there might initially be limited information regarding loans and grants, particularly for small enterprises and/or development projects, new information can be incorporated across time to improve the scorecard system, particularly the precision of the estimated $\hat{\beta}$ parameters. A pilot stage could be a plausible start so that an interim scorecard is built (with limited information) and then, based on the evaluated performance of the selected borrowers/grantees or projects, additional information can be subsequently incorporated

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First, the set of explanatory variables X must contain at least one continuous variable. Second, β cannot be identified without some location and scale restrictions (normalizations). One popular location-normalization is to not include a constant in X; one popular scale-normalization is to assume that the first component of X has a unit coefficient and that this first component is a continuous variable. For further details on semi-parametric single index models, refer to Li and Racine (2006).

to improve the scorecard. This process can continue until a performance history is well established for a reasonably large portfolio of loans/grants.

2.2 Poverty Scorecard

Conditional on meeting the sustainability cutoff, the final selection of projects requires assessing their poverty reduction potential. There are several indicators of the impact on poverty that could be employed. For example, projects/enterprises could be assessed in terms of their labor intensity (low-skilled, female labor) or in terms of their geographical location (by which those projects located in poorer areas are expected to have a greater impact on poverty).

Additionally, the impact of a project is likely to vary from one region to another depending upon local conditions and other factors, such as access to external markets and infrastructure. A project in areas with a high poverty rate and that face infrastructure constraints is expected to have a higher impact on the poor than a project in an area with fewer poor people and no binding constraints. Using poverty maps combined with market access information could be very useful in approximating a project's impact on poverty reduction. Maps of market access, defined in terms of estimated travel time to roads, markets, and/or cities, would be very helpful for sustainability analysis per se, but could also be used for poverty targeting.

Table 1. List of Potential Variables for the Creation of a Poverty Scorecard

Variables	**Criteria for evaluation**
Geographic indicators	
1. Location in poverty mapping space	The project should be executed in places with high poverty rates.
2. Access to markets	The project should be executed in places with low market access, e.g. very low accessibility to a main road or major market (city).
Employment indicators	
3.Labor intensity	Number of new jobs generated by the project.
4. Low-skill labor intensity	Percent of low-skill labor in the project.
5. Female labor intensity	Percent of female labor in the project.
Spillover indicators	
6. Effects on supply chain participants	Total number of direct beneficiaries from the project (ratio based on total amount invested).
7. Other spillover effects (indirect effects, provision of public good)	Total number of indirect beneficiaries from the project (ratio based on total amount invested).

A value chain perspective is also recommended when assessing a project's poverty impacts since there are possible spillover effects across the supply chain (for example, direct and indirect labor effects). The impact on vulnerable populations could also be considered (such as impacts on women's employment and children's education). A list of potential variables that could be included to develop a poverty scorecard is presented in Table 1.

Methodology

When assessing a project's potential impact on the poor, complexity can arise in terms of weighting the outcomes. It is possible that some enterprises/projects perform better in terms of geographical targeting, but do not do well in terms of their potential impact on gender. Consequently, we propose the use of the statistical method of Principal Components to determine the weights for the different outcomes (variables) considered. Principal Component analysis is a statistical technique that creates new variables that are linear combinations of the original variables. The new variables are referred to as the "principal components" and are uncorrelated (orthogonal) to each other. The number of principal components generated is equal to the number of original variables. The first principal component accounts for most of the variation in the data, the second principal component accounts for most of the variance that has not been accounted for by the first principal component, and so forth.

Generally, one or two principal components are needed to account for more than half of the variation in the data. As a rule of thumb for project poverty scoring, we suggest using all first principal components necessary to account for at least half of the data variation. Recall that each component is a weighted sum of the variables considered to measure poverty reduction. Thus, higher values for a component denote a higher poverty impact, whereas lower values denote a lower poverty impact.

Steps to Construct a Poverty Scorecard

Given a set of projects that meet a sustainability threshold, the steps to construct a poverty score can be summarized as follows:

1. Collect all the necessary information from the projects to construct the geographic, employment, and spillover indicators (variables) over which the projects will be evaluated.
2. Normalize the indicators by subtracting the mean and dividing by the standard deviation.
3. Obtain the covariance matrix of the normalized indicators.

$$cov(X,Y) = \sum_{i=1}^{n} \frac{(X_i - \bar{X})(Y_i - \bar{Y})}{(n-1)}.$$

4. Calculate the eigenvectors and eigenvalues of the covariance matrix. Let A be a $n \times n$ matrix. The parameter λ is an eigenvalue of A if there exists a non-zero vector v such that $Av = \lambda v$. In that case, vector v is called an eigenvector of A corresponding to eigenvalue λ. We can rewrite the condition $Av = \lambda v$ as $(A - \lambda I)v = 0$, where I is the $n \times n$ identity matrix. Now, in order for a non-zero vector v to satisfy this equation, $A - \lambda I$ must not be invertible. That is, the determinant of $A - \lambda I$ must be equal to zero. We call $p(\lambda) = \det(A - \lambda I)$ the characteristic polynomial of A. The eigenvalues of A are simply the roots of the characteristic polynomial of A.
5. Choose the necessary first principal components to account for at least half of the variation in the data. Typically, either the first principal component alone (PC1) or the first two combined (PC1 and PC2) would satisfy this condition.
6. Use the selected principal components in step 5 to rank the projects on the poverty dimension. If more than one principal component is selected, the sum of the two components should be considered for the ranking.

3 An Application to a Grant Competition in Central America

In this section, we apply the scorecard system to a real example of project selection for grant allocation in Central America to link smallholders to markets.

3.1 Details of the Program in Central America

In October 2010, the Unidad Regional de Asistencia Tecnica (RUTA), with the technical support of the International Food Policy Research Institute (IFPRI), and with funds from the Multilateral Investment Fund (MIF) of the Inter American Development Bank (IADB) and the Austrian Cooperation in Central America (ADA), launched a program on innovations for linking smallholders to markets in Central America. The nature of the program is pro-poor, market–oriented, and demand-driven, and covers four countries in the region: Guatemala, El Salvador, Honduras, and Nicaragua. In particular, the program is oriented to provide funds (up to a maximum of 250,000 U.S. dollars) for projects that involve creating or improving market opportunities for smallholders in the region, especially in areas with high poverty rates. The projects must be conceived by the same farmers' associations and/or small enterprises applying for the funds.

This program also served as a pilot program to implement the risk and poverty scorecard system described previously. The application process ended in January 2011, the month in which the projects were selected. The projects are currently in the implementation phase.

To ensure transparency, the entire application process was done through a website specifically created for this pilot program. The applicants had to provide

information regarding the association/enterprise applying for the funds, the intended project and its beneficiaries, their credit history (if any), and the project budget and execution plan, as well as any other relevant information. The process also involved filling out some administrative forms.[7] During the launching of the program, the selection methodology (i.e. the risk and poverty scorecard system) was also explained to the potential applicants.[8] Related materials and an explanatory video were posted on the website.

A total of 58 projects were submitted by different farmers' associations and small enterprises across the four countries, out of which 39 were eligible for evaluation. The projects that did not qualify were those for which the applicant failed to provide all the required information and forms indicated in the program guidelines. The amount requested by all 39 projects equaled 7.1 million dollars, and a total of 1.7 million dollars was available for grant allocation.

3.2 Risk Scoring

The risk scoring for the 39 projects (applicants) was obtained following the same steps described in Subsection 2.1. Information from previous loans/grants, including performance and characteristics of the borrowers/grantees, was first gathered from other comparable small enterprises in Latin America. These data served to estimate the parameters of interest using the semi-parametric single index model proposed by Klein and Spady (1993). Finally, the estimated parameters, together with the information provided by the 39 applicants, were used to derive their risk scoring.

A total of ten variables were considered to construct the risk scoring. These included the socioeconomic characteristics of both the beneficiaries of the project and the association/enterprise applying for the grant. In particular, we account for average age, gender, education level, and marital status of the beneficiaries and for seniority, number of workers, asset ownership, and financial information of the applicant. For further details on the variables used, see Table 2. The selection of the variables responds to the fact that they are widely used in the microcredit literature, as well as to the amount of previous information available from the pool of loans/grants from similar enterprises. In the pilot program, additional information was naturally collected to validate the information reported by the applicants.

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[7] To apply, applicants had to first register with a username and password. The application did not have to be completed all at once. There were also contact persons in each country for inquiries during the application process. As a proof of their application, once submitted, applicants received a PDF file via e-mail summarizing the information they reported regarding the association/enterprise, project, and direct beneficiaries (basically the information that would then be used to evaluate their application/project).

[8] The only restriction imposed by the donors for this pilot program was that at least one project had to be selected from each of the four countries. This was also specified at the launching event.

Table 2. List of Variables Used for the Creation of the Risk Scorecard

Characteristics of the direct beneficiaries from the project	**Business and financial characteristics of the association / partnership**
Average age of beneficiaries	Seniority of association (years of activity)
Gender (percentage of men among beneficiaries)	Number of employees / partners in association
Educational level (percentage of beneficiaries with secondary or superior education)	Assets (if association owns land or real estate)
Marital status (percentage of beneficiaries married or in common-law marriages)	Interest rate of most recent loan
	Term of loan / amount requested

The results from the estimation of the single index model to derive the parameters of interest for the risk scoring are reported in the top panel of Table 3. The sign and magnitude of the coefficients should be interpreted with caution, given that they are normalized with respect to the first variable in the set of explanatory variables (in this case, the average age of the beneficiaries). For matters of comparison and ease of interpretation (although assuming a specific functional and distributional form between the likelihood of defaulting and the explanatory variables), in the bottom panel of Table 3, we also report the results from a standard Probit model. As can be seen, the coefficients generally have the expected sign in the parametric set-up. For example, asset ownership and a lower loan term decrease the probability of default, while older, less educated people and men have a higher probability of defaulting, though the coefficients are not always statistically significant at a 5 percent level in this parametric model.

To show the advantages of using a semi-parametric single index model over a standard Probit model, Table 4 compares the predictive performance of both models. To obtain the predictive performance of each model, the estimated default probabilities (which range between 0 and 1) are first converted to a binary regime prediction using the standard 0.5 rule: if the estimated probability is greater than 0.5, the borrower (grantee) is predicted to default, while if the estimated probability is less than or equal to 0.5, the borrower is predicted to non-default. The binary (1/0) estimated probabilities are then compared to the actual default/non-default behavior of the borrower. It follows that the Probit model has a very poor predictive performance for the default cases (28 percent accuracy versus 86 percent for the single index model). Overall, the predictive performance of the single index model is 72 percent versus 48 percent for the Probit model. These results clearly show the advantages of using a semi-parametric technique over a parametric method for adequately estimating the risk score of a pool of potential borrowers/grantees.

Table 3. Modeling the probability of default (dependent variable equal to one if borrower/grantee defaulted, zero otherwise)

A. Single Index Model		
Variable	**Coeff**	**Std. Err.**
Characteristics of beneficiaries		
Average age	1.000	
Percent men	0.136	0.024
Percent with secondary or superior education	–0.250	0.032
Percent married or in common law	0.187	0.025
Characteristics of association		
Years of activity	0.000	0.001
Size (number of workers)	0.016	0.006
If owns land or real state	0.022	0.024
Amount of loan requested (000 dollars)	0.009	0.002
Interest rate previous loan (percent)	0.158	0.019
Term of loan (months)	0.032	0.003
Regression type: local constant		
Model type: Klein and Spady		
Continuous kernel type: Gaussian second order		
Bandwidth:		0.119
# observations		2,899
B. Probit Model		
Variable	**Coeff**	**Std. Err.**
Characteristics of beneficiaries		
Average age	0.008	0.004
Percent men	0.115	0.115
Percent with secondary or superior education	–0.136	0.195
Percent married or in common law	–0.111	0.121
Characteristics of association		
Years of activity	–0.005	0.003
Size (number of workers)	–0.019	0.027
If owns land or real state	–0.284	0.116
Amount of loan requested (000 dollars)	0.012	0.014
Interest rate previous loan (percent)	0.002	0.236
Term of loan (months)	0.046	0.017
Constant	–0.056	0.966
# observations		2,899

Table 4. Predictive Performance of Single Index Model and Probit model

Performance indicator	Single index model	Probit model
Overall correct default/non-default classification	71.8 percent	47.8 percent
Correct default classification rate (sensitivity)	86.2 percent	27.6 percent
Correct non-default classification rate (specificity)	51.9 percent	75.7 percent

After applying the estimated coefficients to the information provided by the 39 applicants, we calculated their risk scoring using equation (3). Imposing a cutoff of 67 percent on the maximum risk score allowed, 24 projects qualified for the second stage of the selection process. Please remember that the idea of this first stage in the evaluation process is to identify those projects with a low or moderate level of risk that also ensures the sustainability of the project. The threshold of 67 percent further guaranteed that at least a certain number of projects would get past the risk scoring stage (see Figure 4). Note also that the projects are not ranked at this stage.

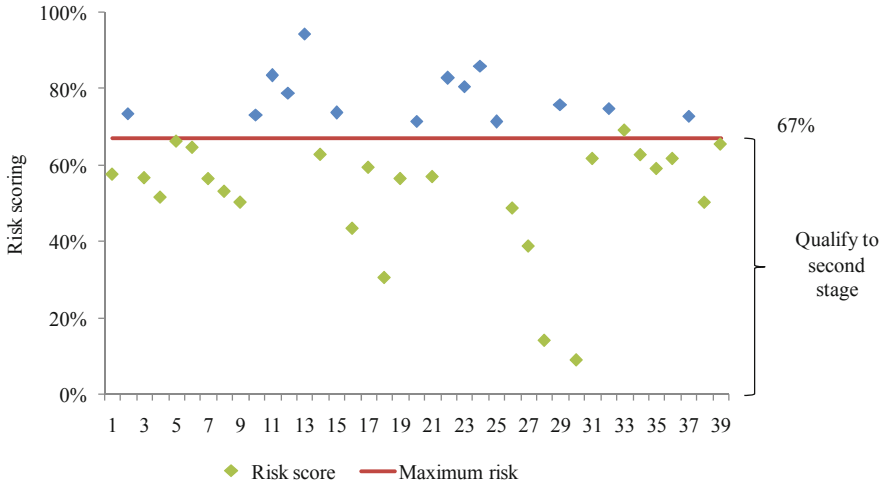

Fig. 4. Risk Scoring Results

3.3 Poverty Scoring

The 24 projects that met the cutoff of 67 percent for the risk scoring were then evaluated in terms of their potential poverty impact following the same steps described in Subsection 2.2. Seven indicators covering the project's geographic,

Table 5. List of Project Indicators for the Creation of the Poverty Scorecard

Indicator	Variable
Geographic indicators	
1. Location in poverty mapping space.	Average poverty rate in area(s) where project will be implemented.
2. Access to markets	Average distance, in hours, of area(s) where project will be implemented to closest major town with a population of 20,000 or above.
Employment indicators	
3.Labor intensity	Total number of new jobs generated by the project.
4. Low-skill labor intensity	Percent of low-skill labor / total labor in the project.
5. Female labor intensity	Percent of female labor / total labor in the project.
Spillover indicators	
6. Effects on the supply chain	Number of direct beneficiaries / total amount invested.
7. Indirect effects	Number of indirect beneficiaries / total amount invested.

Table 6. Principal Component Analysis: Eigenvalues and Eigenvectors

A. Eigenvalues							
	PC1	**PC2**	PC3	PC4	PC5	PC6	PC7
Eigenvalue	**2.22**	**1.40**	1.11	1.05	0.77	0.45	0.00
Variability (percent)	**31.70**	**19.98**	15.84	15.06	10.94	6.47	0.01
Cumulative percent	**31.70**	**51.68**	67.52	82.58	93.51	99.99	100.00
B. Eigenvectors							
	PC1	**PC2**	PC3	PC4	PC5	PC6	PC7
Number of jobs created	**0.659**	**–0.023**	–0.169	–0.043	–0.011	0.031	0.730
Percent Low skilled labor	**0.014**	**0.286**	–0.234	0.753	0.543	–0.023	–0.004
Percent Female labor	**–0.139**	**0.580**	–0.391	–0.390	0.095	0.574	0.007
Direct beneficiaries / amount invested	**0.460**	**–0.317**	0.273	–0.157	0.506	0.431	–0.383
Indirect beneficiaries / Amount invested	**0.536**	**0.184**	–0.411	0.042	–0.360	–0.241	–0.566
Average poverty rate	**0.163**	**0.370**	0.584	0.374	–0.450	0.392	–0.002
Average distance to major closest town	**0.141**	**0.557**	0.424	–0.334	0.328	–0.521	–0.005

employment, and spillover characteristics were considered for the poverty scoring and were built based on the information provided by the applicants. The indicators include the average poverty rate and distance to closest major town of the area(s) of project implementation, total number of jobs created, low-skill and female-to-total labor ratio, and number of direct and indirect (intended) beneficiaries per dollar invested (see Table 5). As in the case of risk scoring, additional information was requested in order to validate the information used to construct the indicators.

Poverty scores were then obtained by applying a Principal Component analysis over these seven indicators. The corresponding eigenvalues and eigenvectors derived from the analysis are reported in Table 6. Recall that associated with each eigenvalue, there is an eigenvector and that the total number of principal components generated is equal to the number of variables (indicators) considered for the analysis (in this case, seven). For the poverty scoring and subsequent ranking of projects, we selected the first two components (CP1 and CP2), given that together they account for more than half of the entire variation in the data (52 percent). The first principal component (CP1) is highly correlated with the total number of jobs created and the number of direct and indirect beneficiaries per dollar invested in the project. The second principal component (CP2) is highly correlated with the female-to-total labor ratio, poverty rate, and distance of area(s) of implementation to closest major town.

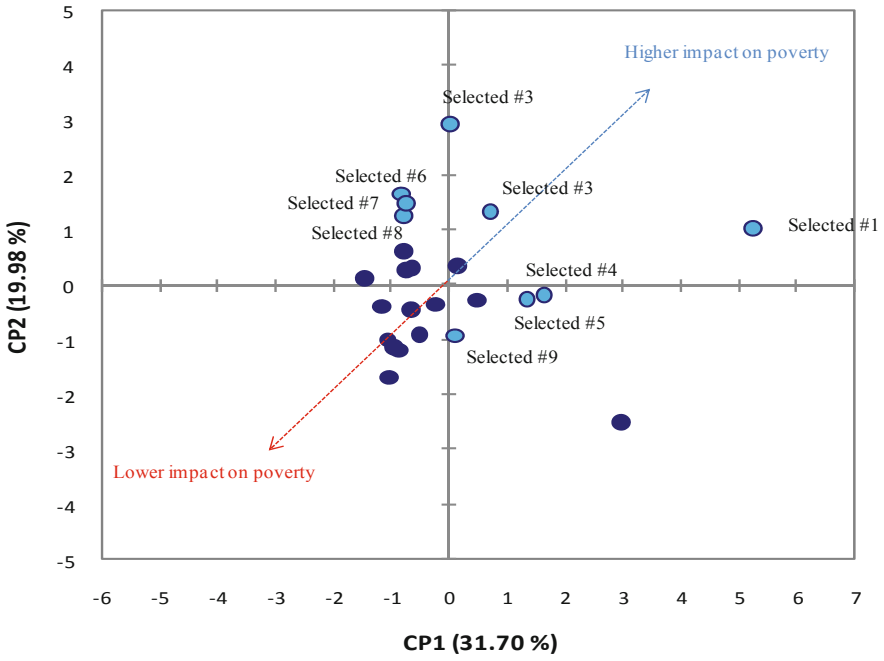

Fig. 5. Poverty Scoring Results

Figure 5 plots the combined scoring of the 24 projects, where the horizontal axis measures the project scoring based on the first principal component and the vertical axis measures the project scoring based on the second principal component. Moving northeast along the 45-degree line implies a higher poverty impact, and vice versa if we move southwest along this line. A total of nine projects were finally selected with a solicited investment of around 1.66 million dollars, slightly less than the 1.7 million dollars allocated for the pilot program. The first eight projects selected were those that obtained the highest poverty score from the Principal Component analysis. The ninth project selected (from Guatemala) strictly obeyed the specific requirement that at least one project from each country be covered by the program.

Table 7 summarizes the distribution of projects (and the amount of funds requested) by country during each stage of the evaluation process: eligible, fulfilled

Table 7. Distribution of Projects Eligible for Evaluation That Get Past the Risk Scoring and That Were Finally Selected by Country

A. Eligible projects		
Country	**# Projects**	**Amount (US$)**
El Salvador	4	786,623
Guatemala	11	1,905,634
Honduras	14	2,697,193
Nicaragua	10	1,725,340
Total	39	7,114,790
B. Projects with a risk scoring below or equal to 67 percent		
Country	**# Projects**	**Amount (US$)**
El Salvador	3	586,713
Guatemala	6	968,946
Honduras	10	1,958,293
Nicaragua	5	955,448
Total	24	4,469,400
C. Selected projects		
Country	**# Projects**	**Amount (US$)**
El Salvador	1	187,075
Guatemala	1	186,700
Honduras	5	992,927
Nicaragua	2	299,759
Total	9	1,666,461

the risk score requirement of 67 percent or less, and selected. As mentioned above, the projects are currently in the implementation phase; a posterior impact evaluation of the selected projects will serve to extend the working database for risk scoring and to improve the scorecard system. The selected projects are intended to benefit nearly 6,000 people (50 percent of which are women) in areas with high poverty levels.

4 Concluding Remarks

This chapter develops a poverty-sensitive scorecard system for lending or grant allocation in developing markets. The proposed methodology used to evaluate loan or grant applications involves constructing both risk and poverty scoring to assure both the sustainability of the project and a high poverty impact. In the first stage, a risk scorecard is developed using a semi-parametric econometric model to assess the default probability of the potential borrowers/grantees. In a second stage, following a Principal Components analysis, a poverty scorecard is constructed to evaluate those projects (borrowers) with a risk score below a certain threshold in terms of their potential poverty reduction. In other words, projects that were proven to be sustainable in the first stage are ranked in the second stage in terms of their potential impact on poverty. We finally implement the scorecard system in a pilot program of grant competition in four countries in Central America to link rural smallholders to markets.

The improvement of the proposed scorecard system over the existing methodology is twofold. First, the use of the latest developments in econometric modeling for the risk scoring allows us to improve the accuracy of risk ranking and to better approximate the sustainability of potential projects under evaluation. Second, by combining two scorecards, our proposed methodology goes beyond poverty scorecards to prioritize lending or grant allocation. Schreiner (2010), for example, recommends a poverty-targeting approach based on identifying high poverty areas using household surveys to prioritize lending. Our proposed lending/grant allocation criterion goes beyond this: it ranks enterprises (projects) with a poverty reduction potential that are also proven to be sustainable. Sustainability is a necessary condition for poverty reduction and a relevant matter in underdeveloped countries, where the problem of adverse selection is acute. Ultimately, the idea is to help policymakers choose from loan or grant applications based on both the chances of project survival and the poverty reduction potential. Additionally, to the extent that we suggest using spatial data and relate to poverty maps, Schreiner's proposed scorecard is nested in the second stage of our scorecard.

The proposed scorecard system should also be viewed as a dynamic process that can be further improved across time, particularly when there is initially limited information for risk assessment. Initial pilot programs, such as the one described in this chapter, could help to provide additional information (based on the performance evaluation of the selected projects) to extend the working database for scoring as-

sessment and to keep improving the scorecard system. This process can continue until a performance history is well established for a reasonably large portfolio of loans/grants. In the long run, the risk scoring mechanism could operate through a simple, implementable program in open-source software (such as a spreadsheet).

Future research should involve formally evaluating the effectiveness of the proposed scorecard system over simple poverty-based targeting and/or over standard risk-based criteria. The further application and extension of pilot programs in developing areas on different contexts will help to perform this exercise.

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Index

Keywords

address risk 151, 187, 191, 192
adverse selection 121, 142, 149, 153, 264, 282
aesthetic quality 32
agribusiness 10, 15, 18, 51, 58, 59, 75, 78, 79, 82, 117, 158, 168, 184, 191
agricultural commodity 76, 153, 190, 199
agricultural credit 90, 106, 107, 127, 128, 148, 152, 157, 160, 170, 193, 223, 253
agricultural credit paradigm 90, 106, 223
agricultural credit programs 90
agricultural development bank 3, 91, 145, 148, 264
agricultural growth corridor 67–75, 78, 82, 83, 85, 86
agricultural insurance 36, 133, 153, 162, 182, 199, 202, 204–207, 209, 210–215
agricultural insurance systems 199, 202, 204–207, 209, 213–215
agricultural loans 12, 34, 89, 97, 99, 101, 104, 107, 120, 121, 124, 125, 129, 131, 145, 148, 159, 178, 184, 199
agricultural microfinance 90, 133, 157, 160, 162
agricultural productivity 26, 34, 68, 72, 80, 82, 84
agricultural risk 25, 33, 35, 36, 38, 118, 140, 154, 155, 161, 167, 170, 172–175, 181, 183, 184, 186, 188–191, 210
agricultural value chain finance 11, 167, 171, 172, 187, 192
agricultural value chains 4, 10, 14, 17, 32, 70, 74, 149, 171
agri-food sector 48, 49
agro loan 119–126, 128, 129, 130
agro-consulting 27
agro-dealers 70
agro-food value chains 15
agro-processing 24, 75, 82, 193
animal feed industry 143
armed guards 102
asset-backed lending 146
asymmetric information 142, 149, 154, 175
ATM 230, 231, 257, 258
avian influenza 201

banana 25, 52, 80
barley 46, 59
beans 50, 52, 80
beef 80, 128
biodiversity 16
biofuel 143
biofuel industry 143
biometric reading devices 102
bonus/bonus system 131
borrower screening 142, 149
branchless banking 158, 221, 226, 228, 232, 234, 239, 248, 256–260
breadbasket strategy 76
brick-and-mortar 256
burial societies 103
business development service 13
buy-back clause 191

cadastre 127, 133, 159
cadastre systems 159
cash crops 131, 144, 193
cash flow 13, 17, 18, 56, 60, 94, 95, 99, 100, 118, 120, 122, 147, 149, 162, 183, 187
cash flow-based lending 149
catastrophic events 154, 155, 160, 181

D. Köhn (ed.), *Finance for Food: Towards New Agricultural and Rural Finance*,
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cattle 14, 121, 125, 126, 128, 129, 152, 201
cell phone/mobile phone 4, 9, 10, 27, 36, 85, 95, 105, 211, 226, 227, 229, 231–233, 235, 236–238, 253, 255, 256, 258–262
cereals 4, 31, 47, 48, 80, 199, 208, 209, 213
climate change 4, 7, 10, 68, 141, 142, 154–156, 200, 201, 202
climatic factors 132
cocoa 4, 48, 49, 59, 188
coffee 4, 16, 48, 49, 59, 80, 100, 177, 188
coinsurance pool 206
collateral 17, 35, 57, 59, 95, 100, 101, 107, 119–121, 127, 133, 142, 146, 147, 149, 159, 168, 171, 172, 174, 178, 188–192, 199, 202, 264, 269
collateral demands 264
collateral problem 149
collection points 133
commercial banks 91, 102, 103, 115, 139, 146, 257
commercial farmer 25, 31, 78, 140, 152, 159
commercial loans 101
commodity exchanges 143, 190, 193
commodity prices 23, 100, 141, 157
common risk 141
community funds 103
contamination risks 199
contingent borrowing 151
contract-farming 54, 57, 59
cooperatives 16, 54, 89, 91, 98, 103, 104, 145, 155, 156, 190, 206, 211
coping mechanisms 153
corn 29, 143
corporate finance 101
corruption 116, 121
cotton 4, 13, 46, 51, 55, 56, 59, 189
co-variant risk 33, 36, 104, 130, 144, 161, 173–176, 181
credit assessment 35
credit delivery costs 225
credit guarantee funds 156
credit line-manager 128
credit programs 145, 264
credit unions 103, 105, 106
crop and grassland production 200
crop insurance 102, 132, 151, 153, 154, 156, 160, 200, 203, 204, 207, 213, 214
crop insurance systems 200, 203
crop losses 200–203, 208
crop rotation 151, 152, 175, 200
cross-selling 36, 239, 240
current accounts 124, 238
cybercafés 240
cyclical cash flow 158, 162

dairy 46, 48, 50–52, 58, 60, 80, 128, 130
default 57, 101, 103, 121, 131, 133, 146, 181, 184, 191, 224, 225, 245, 264, 265, 267–271, 276, 277, 278, 282
default probability 191, 265, 267, 269, 282
demography 4, 5
deposit 14, 37, 99, 102, 105, 115, 116, 162, 170, 222, 225, 226, 233–238, 242, 260
developing markets 84, 86, 263, 265, 282
Development Finance Institutions (DFI) 89, 115, 160, 183, 194, 248
development organizations 154
directed lending 159
disease 130, 132, 133, 200, 203
distribution 8, 15, 16, 23, 28, 32, 36, 37, 45, 47, 49, 75, 119, 121, 133, 153, 154, 172, 187, 202, 206, 211, 227, 232, 238, 256, 258–261, 269, 281
distribution costs 36, 119, 121, 187
diversification 10, 18, 36, 96, 104, 116, 124, 147, 148, 152, 153, 156, 158–160, 174, 184, 186, 192
donors 18–20, 71, 76, 80, 83, 89, 92, 101, 106, 108, 139, 154, 159–161, 173, 176, 177, 179, 183, 185, 194, 209, 248, 249, 264, 275
drainage 201
drought 145, 151, 161, 173, 174, 200, 209–211
Dutch Disease 116

EasyPaisa 259–262
efficiency 20, 36–38, 61, 81, 86, 93, 94, 105, 107, 126, 127, 133, 213, 221, 225, 228, 229, 264

El Niño/Southern Oscillation 210
electricity 77, 80, 116, 142
electricity grids 77
epizootic disease 201, 203
ethanol 143
e-wallet 235, 237, 238
export 3, 4, 15, 34, 48, 49, 52, 59, 61, 69, 78, 95, 144, 149, 177, 188, 189, 193
export crop 4, 95, 149, 189
export markets 193
ex-post payments 202
extractive industries 116
extreme weather events 154, 176, 200
e-zwich 235

fair trade 16, 50
farmer 25, 31, 34, 57, 58, 60, 74, 95, 102, 104, 108, 125, 126, 130, 140, 141, 143, 149, 151–154, 159, 162, 170, 175, 178, 180, 183, 187–192, 202, 206–208
farmers associations 188
farming sector 80, 176, 199, 204, 213
female labor 272, 279
fertilization 133, 200
fertilizer 27, 51, 69, 81, 82, 90, 150, 170
finance and risk transfer solutions 199
financial cooperative 104, 105
financial infrastructure 107, 159
financial literacy 142, 223, 225
financial market 56, 90–93, 107, 118, 168, 221, 223
financial risk 141, 168, 179, 248
financial systems approach 91, 150, 157
fish 28, 48, 49
flood 7, 98, 161, 173, 200, 210
flooding 128, 131, 144, 155, 160, 161, 173, 200, 210, 211
flowers 49
food distribution systems 32
food industry 50, 143
food loss 27–29, 32, 38
food processing 50, 54
food security 3, 11, 19, 23, 24, 27, 28, 31, 38, 67, 68, 71, 74, 87, 141, 144, 157, 174, 184
foot and mouth disease (FMD) 176, 201
Foreign Direct Investment 47, 50
forward contract 56, 177, 190–192
fraud 99, 104, 123, 129, 130, 214, 222, 248, 259
fruit trees 13, 125
fruits 28, 45, 47–49, 51, 52, 53, 59
future-flow securitization 172
futures 177, 190, 192

gas 102, 116, 240, 242
gas stations 102, 240
gender 273, 275, 276
Georeference and Geographical Information Systems (GIS) 213, 214
global commodity markets 143
global value chains 45, 46
government 3, 11, 18, 19, 24, 26, 54, 57, 61, 62, 67, 70, 71, 73, 75, 76, 79–81, 90, 91, 98, 104, 106, 116, 117, 119, 127, 131, 139, 141, 144, 145, 151, 153–157, 159, 160–162, 173, 174, 176, 177, 182, 184, 194, 201–204, 248, 264
government interventions 144, 145, 174
GPS 102
grain crops 129
grains 28, 29, 32, 46, 51, 59, 72, 189
grant allocation 263, 265, 274, 275, 282
green revolution 70–74, 76, 85, 180
greenhouses 58
guarantee 16, 58, 101, 149, 156, 162, 178–181, 186, 206, 209–212, 214
guarantee schemes 179–181

hail 144, 151, 153, 161, 173, 200, 205, 209
hail insurance 153, 205
harvest 16, 27, 29–33, 60, 81, 100, 120, 122, 143, 147, 170, 188, 191, 208, 214
harvesting equipment 28
hawala/hundi money transfers 254
hedging 152, 190, 192
high value chains 46, 53
high-value food products 23
highway 80
high-yielding crop 142
holistic view 149
horticultural revolution 52
horticulture 53, 59, 60, 80

household 26, 60, 100, 120–122, 125, 126–128, 142, 144, 147–152, 159, 161, 162, 173, 222, 254, 282
human resources risk 141
hurricane 99, 200
hybrid model 157, 158, 160, 162
hydro-meteorological events 155

idiosyncratic risk 161, 173
illiterate/illiteracy 106, 230, 244
immovable assets 146
income diversification 125, 175
indemnification 199, 202–204, 208
indemnity payments 154
independent risk 144, 175
index insurance 9, 14, 101, 162, 204, 207, 208
index products 206, 208, 212, 213
index-based insurance schemes 154, 156
individual lending 36, 94–96, 98, 264
informal household enterprises 149
information asymmetry 9, 188
infrastructure 6, 8, 19, 24, 26, 34, 36–38, 67, 69–71, 73, 76–81, 83, 84, 85, 91, 97, 116, 139, 142, 154, 160, 162, 184, 193, 208, 222, 225, 226, 228–230, 234, 240, 244, 257, 272
innovation 69, 78, 83, 205, 209, 212, 213, 239, 269
institution building 107
insurance 6, 13, 14, 17, 60, 77, 83, 86, 99, 101, 107, 108, 118, 151–158, 160, 161, 173, 176, 201–214, 233, 237, 253–255, 259, 262
intercropping 152
interest rate 16, 90, 91, 93, 94, 97–100, 103, 106, 107, 118, 126–128, 145, 150, 159, 160, 174, 175, 211, 245, 264, 268, 276, 277
interest rate cap 106, 107, 174
interest rate ceilings 106, 145, 174
Internet 4, 9, 211, 222
inventory 32, 59, 120, 129
inventory credit schemes 32
irrigation 6, 51, 58, 69, 70, 78–80, 175, 184, 200, 201
IT systems 212, 223

joint liability groups 149, 234

Kilimo Kwanza (Agriculture First) 80

labour market 36
land reform 117
landless 253
landslides 144, 211
least developed countries 8
legal framework 92, 142, 159, 160
lifestyle 32
livestock disease 151
livestock sector 201–203
loan loss provisions 99, 148
loan monitoring 224, 225, 234
loan officer 92, 94–96, 99, 100, 102, 118–120, 124, 125, 128, 129, 131, 132, 147, 162, 228, 246
loan pyramid 123, 129, 130
loan waivers 159
lobbying 14, 157
local market 47, 53, 96, 117, 132, 143, 189, 244
longterm investments 30
lottery kiosks 240
low-latitude countries 201
low-skilled 272

maize 25, 28, 31, 59, 100, 101, 143, 145
Malswitch network 102
Management Information Systems (MIS) 9, 20, 95–97, 124, 222, 225, 229, 231, 233–235, 244
Maputo Declaration 71
market failure 90, 151, 154, 155, 158, 161, 173, 176, 264
market infrastructure 23, 160
market risk 13, 35, 118, 141, 143, 144, 150, 152, 199
market-based risk transfer mechanisms 156
marketing board 54, 57
marketing cooperatives 133
marketing technology 133
maturities 120, 132
Member-owned financial institutions (MOIs) 103
membership-based organizations 162
micro loans 149
microbusinesses 105

microfinance 3, 6, 11–13, 17, 35, 37, 38, 85, 89, 90, 92, 94, 103, 106–108, 115, 147–150, 157, 158, 159, 162, 168, 175, 179, 201, 211, 221, 226, 255, 257, 258, 264
microfinance institutions (MFI) 6, 13, 37, 38, 89, 92, 93, 96, 97, 103, 146–149, 158, 162, 168, 184, 211, 221, 234–237, 242, 245–247
microfinance programs 150
microfinance revolution 150
microfinance technology 150
microinsurance 14, 89, 107, 158, 201, 207, 236
micro-lending 120–123, 127, 130, 132, 133
micro-loan 119, 120, 122, 125, 126, 129
migration 4, 6, 7
millet 8
missing middle 3, 140
mobile banking 27, 229, 235–239, 242, 243, 246–248, 253, 256, 257, 262
mobile network operators 235
mobile penetration 255, 256
mobile phone networks 211
mobile vans 102, 103
modern rural finance 11, 13
money transfer 27, 36, 85, 102, 124, 161, 170, 233, 236, 260–262
money transfer services 124
monitoring 13, 27, 96, 97, 100, 101, 108, 119, 129, 142, 148, 150, 158, 174, 175, 179, 180, 214, 223, 227–229, 234, 240, 242, 243, 245
monoculture 142, 152
moral hazard 142, 146, 149, 153, 187, 191, 240
movable asset 147, 159
MPS 227, 235–238
Multiline insurance companies 204

natural disaster 131, 154, 155, 160, 176
natural risks 162, 199, 200, 203, 213
networks 79, 83, 85, 104, 105, 107, 108, 139, 211, 226, 232–235, 237, 238, 241, 242, 248, 255, 262
new paradigm 17, 91, 92, 150, 157, 159
new rural finance paradigm 150
non-farm activities 91, 148, 152, 170, 253
non-farm income 79, 119, 125, 175
nonparametric 263, 265, 269, 270
nonparametric estimation methods 269
normal risk 151

off-farm activities 10, 12
oil 56, 59, 116, 143, 177, 200
oil seeds 143
oilseed sector 56
old paradigm 12, 90, 106, 148, 150, 152, 159, 170
oleiferous crops 213
options 62, 72, 77, 95, 146, 151, 152, 159, 177, 190, 192, 248, 268
organic production 50
organised value chains 31–34, 172, 190, 193
outgrower scheme 57, 177, 191
overconcentration 93

packaging 28, 29, 31, 33
pathogen outbreaks 200
payment service 36, 161, 226, 229, 235, 237, 239, 247, 261
peri-urban clients 89, 92
personal digital assistants (PDA) 105, 162, 229, 231
pest 119, 161, 173, 200
pharmacies 240
pilot project 158, 160, 209, 210, 249
point-of-sale (POS) 102, 105, 162, 231, 232, 234, 236, 242, 258
political interference 12, 141, 162, 174
political risk 131, 141, 144, 146, 150, 157, 173–175, 181, 182, 184, 192, 199
population density 9, 97, 222, 225, 227, 229
population growth 23, 67, 69
populist measures 145
portfolio at risk 102, 116, 122, 127–129
portfolio guarantee 132, 176–179, 181, 183, 192
portfolio management 148, 206, 209, 213
POS 102, 105, 162, 231, 232, 234, 236, 242, 258

POS technology 242
POS terminal 102, 232
post offices 233, 240, 242, 257, 261
post-harvest financing 189
post-harvest loss 27–34, 38, 82
post-harvest system 27–31, 34
potatoes 80, 129, 203
poultry 59, 80, 203
poverty 3, 9, 12, 26, 46, 47, 49, 61, 67, 73, 79, 80, 82, 98, 106, 108, 117, 150, 174, 253, 263, 265–267, 271, 272–275, 278, 279–283
poverty reduction 26, 49, 61, 108, 150, 174, 263, 265, 267, 272, 273, 282
poverty scorecard 263, 265–267, 272, 273–275, 279, 282
precautionary savings 151, 152, 157, 159
premium subsidies 206
price control 144
price risk 141–143, 152, 158, 162, 174, 178, 190–193
price uncertainty 143, 174
price volatility 143, 192, 269
principal credit risk 141, 142, 146, 173–175, 179, 180, 181, 183, 192
priority and subsidized lending 264
probit model 270, 276–278
processing 15, 24, 27, 29, 30, 32, 33, 35, 45, 47, 49–51, 54, 56–58, 60, 77, 90, 100, 117, 170, 171, 186, 188, 191, 213, 225, 234, 235, 242
production risk 60, 99, 141, 142, 174, 190–193, 206
project finance 147
property rights 107, 147, 159
pro-poor growth 46
public goods 34, 38, 107
public investment 26, 33, 81
Public-Private Partnership (PPP) 19, 34, 38, 67, 70, 74, 76, 153, 160, 184, 199, 205, 214
purchasing feed 126

quotas 145

rail transport 34
railways 77
receivables-backed finance 177, 187, 188
refrigeration 28, 52
register 127, 133, 275
registry 159
re-insurance 156
reinsurance arrangements 206
reinsurance company 199
remittance services 89, 243, 254
remittances 6, 13, 18, 124, 245, 255, 260
remote-sensing technology 209, 213, 214
repayment capacity 92, 94, 95, 100, 118, 120, 126, 141, 146, 147, 162
retail company/retail chain 32, 47, 51, 53, 242
rice 8, 59, 60, 152, 184
risk assessment 38, 129, 156, 173, 224, 225, 234, 267, 269, 282
risk capital 70, 206
risk management 38, 92, 131, 139, 140, 144, 146–152, 154, 155–161, 167, 172, 173, 175, 176, 181, 186, 190, 199, 201, 202, 204, 213, 214
risk management strategy 150, 159, 161, 173
risk mitigation 9, 107, 131, 132, 158, 159, 167, 186, 192
risk pooling 149, 152, 155, 156, 161, 173, 176
risk retention 151, 155, 156, 159, 161, 173
risk retention layer 151, 159
risk scorecard 265, 266, 268, 271, 276, 282
risk tranche 169, 181
risk transfer 132, 150, 152, 154, 155, 158, 160, 161, 168, 173, 176, 181, 190, 191, 204, 206, 208
risk-based supervision norms 148
risk-transfer tools 201
road 25–27, 30, 33, 37, 79, 116, 222, 272
road connectivity 26
road infrastructure 26, 27, 30, 33, 37, 222
roaming officers 227, 229, 230, 244
rotating saving and credit associations (ROSCAs) 103
rural finance 3, 11–13, 17, 18, 19, 35, 37, 38, 91, 96, 97, 103, 104, 107, 139, 148, 150, 152, 157, 162, 170, 184, 186, 223, 224, 226, 247, 253

rural financial institution 140, 142, 148, 150, 152, 162, 171, 184, 186
rural households 3, 5, 10, 12–14, 17, 19, 31, 53, 54, 59, 94, 106, 118, 119, 121, 125, 126, 133, 170, 175, 202, 223
rural income generation 49
rural MFI 147, 186, 233
rural microenterprises 150
rural microfinance 90, 149, 202
rural road infrastructure 33
rural road network 34
rural transport 24, 38

sanitary and phytosanitary measures 50
savings 6, 14, 16–18, 31, 36, 37, 89, 91, 97, 98, 101–105, 108, 124, 148, 152, 157, 159–162, 225, 226, 227, 229, 230, 234, 235, 237, 238, 243, 245, 246, 253, 254, 262
savings mobilization 89, 91, 97, 98, 105
savings products 98, 124
scorecard 263–265, 267, 268, 271, 272, 274, 282, 283
sea ports 34
seafood 48, 49
seasonal agricultural production 89
seasonal workers 27
seasonality 96
securitization 168, 177, 181–183, 192, 193
security cameras 102
seed stock 133
seeds 27, 28, 51, 56, 70, 77, 82, 84
segmentation 139, 151, 161, 169, 173, 179, 181
self-help groups 103
sharecropping 152
sheep 58, 121, 125, 126, 128, 129, 201
side-selling 191
small and medium enterprise (SME) 7, 122, 139
small farm households 150
small farmer 4, 10, 13, 14, 18, 35, 46, 47, 49, 51–55, 100, 104, 139, 141–143, 145, 146–150, 152, 153, 154, 156, 158–160, 167, 171, 172, 175, 189, 193, 253
smallholder 23, 46, 47, 49, 52, 59, 60, 70, 73–76, 79, 80, 81, 85, 101, 117, 118, 133, 174, 180, 190, 191, 201, 205, 208
smallholder farmers 70, 73, 75, 79, 81, 85, 101, 118, 191, 201, 208
smart cards 102, 162
SME-type commercial farmers 139
social venture capital 75, 80
soybeans 143
special purpose vehicle (SPV) 58, 177, 182, 183
specialized training 120
specific agricultural credit risk 173, 174, 180, 192
specific risk 139–142, 144, 146, 150, 152, 158, 160, 167, 169, 170, 175, 176, 181, 182, 184, 186, 207
standardization 36
standards 28, 45–47, 49, 50, 51, 53, 126, 172, 189, 193, 258
staple crop 143
state-owned agricultural banks 34
state-run funds 202
state-run marketing boards 144
storage 27–32, 34, 57, 77, 81, 82, 117, 126, 133, 152, 193, 212
storage facilities 30, 34, 77, 126, 133, 152, 193
structured finance 36, 167–169, 175, 176, 177, 184, 186, 189
structured fund 168, 176, 177, 184–186, 192
subsidies 89, 98, 107, 108, 127, 144, 153, 156, 159, 160, 264
subsidized interest rates 12, 34, 127, 264
subsistence 3, 5, 12, 18, 25, 31, 80, 84, 118
subsistence farmers 25, 31
sugar 48, 50, 51, 58, 60, 80
sugarcane 59
sunflower seeds 56
sunflowers 80
supermarkets 8, 27, 28, 32, 47, 50, 53, 75
SystemAgro 204, 205
systemic risk 148, 156, 173

tea 46, 48, 49, 59, 80
technology application 73
telecommunication 142, 229, 256

telecommunication network 229
telecommunications systems 77
tobacco 9, 48, 59
trade 3–5, 13, 24, 28, 30, 32, 33, 35, 46, 50, 51, 57, 61, 74, 78–83, 100, 116, 126, 130, 149, 170, 184, 187, 188, 190, 263
traditional agricultural finance 150, 157
transaction and distribution costs 119, 124
transaction costs 9, 10, 45, 46, 51, 52, 84, 91, 92, 145, 153, 160, 162, 223–225, 227, 228–232, 235, 236–238, 243, 245–247
transitional economy 115
transport 6, 24–35, 57, 70, 83, 84, 130, 222, 225, 229
transport cost 25, 27, 225
travel cost 27, 241
tsunami 151, 155, 160
tuber 28, 203, 213

urban market 11, 25, 36, 45, 47

value chain finance (VCF) 11, 15, 32, 47, 50, 52, 54, 56–62, 149, 171, 172, 187, 190, 193
value chain financing 11, 14–17, 19, 32, 47
value chain financing schemes 32
value chains 6, 8, 11, 15, 18, 20, 45–47, 49, 50–53, 55, 59, 67, 74–77, 79, 82, 85, 117, 149, 171
vegetables 28, 45, 47–49, 51, 52, 53, 59, 80, 130, 209
village banks 97
village shops 240
village-level savings groups 103
volatility 174
vouchers 229

warehouse 32, 59, 86, 95, 102, 172, 177, 188–190, 192, 193
warehouse receipt 32, 59, 86, 95, 102, 172, 177, 188–190, 192
warehouse receipt finance 59, 172, 177, 188, 190, 192
warehouse receipt payments 59
warehouse receipt systems 32, 59
waste 7, 27, 28, 32
water 7, 10, 68–70, 77, 79, 98, 116, 175, 200
water supplies 200
weather 9, 14, 25, 35, 68, 86, 101, 107, 108, 118, 141, 142, 151, 154, 158, 161, 170, 173, 174, 200, 207, 208, 210–212
weather data 154
wheat 143, 145, 184
wholesale 49, 170, 241
working capital 16, 30, 33, 57, 94, 126, 187, 189
world population 23, 68, 133, 199
write-off 98, 119, 123, 145, 180

yield 67, 89, 120, 125, 142, 158, 207–210, 213, 214
youth 4–6, 10, 18

Countries

Angola 72
Azerbaijan 35, 115–119, 122, 123–129, 132, 133
Bangladesh 93, 95–97, 106, 229, 245, 254, 258
Benin 228, 233
Bolivia 49, 93, 94
Brazil 8, 32, 71–73, 104, 153, 177, 188–190, 210, 211, 235, 242
Bulgaria 50
Burkina Faso 13, 86, 104, 228
Canada 104, 200, 208
Chad 26
Chile 62, 210, 211, 238
China 7, 8, 26, 46, 50, 52, 53, 71, 80, 90, 153, 184, 205
Colombia 177, 183, 210
Congo (DR) 26, 41, 80
Costa Rica 25, 39, 196
Cote d'Ivoire 49

Croatia 58, 177
El Salvador 96, 274, 281
Ethiopia 49, 71, 72, 86, 177
Germany 25, 94
Ghana 35, 52, 72, 86, 101, 145, 188, 235, 243
Guatemala 49, 274, 281
Guinea 72
Honduras 49, 274, 281
India 8, 9, 14, 59, 93, 106, 145, 154, 177, 189, 233, 243, 254
Indonesia 151, 157, 228
Kazakhstan 46, 51, 55, 56
Kenya 52, 85, 86, 104, 184, 233, 234, 236, 240–242, 245, 246, 260
Luxemburg 186
Madagascar 26, 46, 52, 53, 55, 60, 61
Malawi 72, 79, 80, 101, 102, 108, 228, 230, 244
Mali 6, 13, 78, 146, 228
México 16, 105, 106, 177
Moldova 134, 228, 250
Mozambique 59, 67, 69, 72, 73, 79, 86, 87
Namibia 233, 238, 244
Nepal 26
Nicaragua 35, 93, 106, 274, 281
Nigeria 73
Norway 75, 81
Pakistan 93, 144, 155, 160, 237, 253–256, 258, 261
Peru 91, 112, 177, 210
Poland 46, 50
Romania 50
Russia 46, 51, 56
Rwanda 86, 177, 237
Senegal 11, 46, 49, 50, 52, 53, 55, 60, 61, 177, 237, 245
Serbia 35
Slovakia 58
South Africa 79
Sri Lanka 46, 104, 254
Tanzania 25, 68, 71–73, 76, 79–81, 86, 87, 177, 237, 245
Thailand 71–73, 97, 145, 148, 157
Tunisia 13
Uganda 60, 72, 93, 99, 101, 143, 237
Ukraine 35, 140
United States of America 28, 200
Vietnam 71
Zambia 52, 59, 73, 79, 80
Zimbabwe 52, 79

Organisations

AccessBank 35, 115–133
AccessHolding 107
ACCION 107
Africa Progress Panel 68, 74, 75
African Agriculture Fund 171
African Development Bank (AfDB) 6, 82, 83, 184
African Union 71, 86
Afrika Agriculture and Trade Investment fund (AATIF) 184
AgDevCo 70, 75, 81
Agence Française de Développement (AfD) 83, 178
Alliance for Green Revolution in Africa (AGRA) 10, 74, 76, 177, 180
ASA 67, 71, 81, 95
Austrian Development Agency (ADA) 274
BAAC 97, 98, 145, 148, 149, 156, 157
Banco do Brasil 242
Banco Popular 242
Bank for Agriculture and Agricultural Cooperatives (BAAC) 97, 98, 145, 148, 149, 156, 157
Bank Rakyat Indonesia (BRI) 97, 98, 148, 149, 157, 228
Basix 14
Belgische Investeringsmaatschappij voor Ontwikkelingslanden (BIO) 177, 186
Bill and Melinda Gates Foundation 237
Black Sea Trade and Development Bank (BSTDB) 115
Catholic Church of Uganda 99
CAURIE Microfinance 245
Centenary Bank 99, 101
Center for Stratetgic & International Studies (CSIS) 84
Chase Bank 184

Citibank 257
Columbia University 73
Common Market for Eastern and Southern Africa (COMESA) 82
Consultative Group to Assist the Poor (CGAP) 103, 107, 152, 163, 226, 237, 243, 248
DeLaval 58
Deutsche Bank 184
Deutsche Investitions- und Entwicklungsgesellschaft (DEG) 177
Development Credit Authority (DCA) 156, 177–179
Drokasa Peru 177
Earth Institute 73
Economic Commission for Africa 74, 83
Economic Report on Africa 2009 74
Equity Bank 236, 237
European Bank for Reconstruction and Development (EBRD) 56, 115
European Investment Bank (EIB) 177, 186
FIDES 233, 238, 244
Finadev 233
Financiera Compartamos 177
FINCA 107
Food and Agriculture Organization (FAO) 11, 56, 76, 89, 91, 199, 201
Grameen Bank 94, 97, 245, 264
Grameenphone 258
Horus 221, 231, 237
Incofin 97, 177, 186
Infrastructure Consortium for Africa (ICA) 83, 84
Inter American Development Bank (IADB) 274
International Fertilizer Development Center 82
International Finance Corporation (IFC) 115, 177, 178, 186
International Food Policy Research Institute (IFPRI) 263, 274
International Fund for Agricultural Development (IFAD) 9, 12, 54, 59, 85, 89–91, 177
International Institute for Tropical Agriculture 70
IPC 94, 98, 99
KfW 3, 23, 26, 45, 89, 115, 119, 139, 167, 177, 184, 188, 243
Kreditimi rural I Kosoves (KrK) 147
LFS 115, 119
McKinsey 4, 10, 68, 78
Mexican Secretaria de Agricultura y Ganaderia (SAGARPA) 105
MIX Market 93, 101, 102, 107
M-Kesho 234, 236, 237
M-Pesa 85
Multilateral Investment Fund (MIF) 274
Nederlandse Financierings-Maatschappij voor Ontwikkelingslanden (FMO) 177, 186
NEPAD Business Foundation 76
NetCash 242
Opportunity Bank Malawi 238
Opportunity International 101, 107, 108, 228, 230, 244
Orange 237
Organisation for Economic Co-operation and Development (OECD) 140, 142, 144, 151–153, 155, 161, 173
Organisation of African Unity (OAU) 82
PADME 228, 233
PagFacil 242
PlaNet Finance 237
ProCredit 35, 96–98, 100, 107, 228
ProCredit Bank El Salvador 96, 98, 100
ProCredit Holding 98
Prorustica 75, 76
Proyecto Regional de Asistencia Técnica al Microfinanciamiento Rural (PATMIR) 105, 106
PTA Bank 184
Rabobank 177
Reseau des Caisses Populaires du Burkina (RCPB) 104
Rural Impulse Fund (RIF) 97, 177, 184, 186
Safaricom 260
SafeSave 229, 245
SAID 177
SANASA 104
Sistema de Cooperativas de Crédito (SICREDI) 104
SKS 106
SMEP 235, 245, 246

Southern Agricultural Growth Corridor of Tanzania (SAGCOT) 67, 75–77, 79, 80, 81, 84
Standard Chartered 177
Starbucks 16, 188, 191
Sustainable Agriculture Guarantee Fund (SAGF) 177
Tameer Bank 253, 257, 259
Telenor 237, 257–261
Unidad Regional de Asistencia Técnica (RUTA) 274
Union Progreso 177
United Nations International Strategy for Disaster Reduction 155
USAID 35, 76, 81, 156, 177–179
Verde Ventures 16
Wimm Bill Dann (WBD) 58
World Bank 5, 47, 48, 50–52, 54, 56, 58, 59, 75, 76, 78, 79, 81, 83, 86, 89–91, 104, 116, 117, 140, 143, 151, 153, 154, 159–161, 167, 235, 243
World Council of Credit Unions (WOCCU) 105, 106
World Economic Forum (WEF) 76, 78, 86
World Food Program (WFP) 9, 202
World Trade Organization (WTO) 5, 50
Xacbank 234, 238
Yara International 67, 71, 81
Zain 260