

Report No. 32726-GLB

Rural Finance Innovations

Topics and Case Studies

April 2005



The World Bank
Agriculture And Rural Development Department

© 2005 The International Bank for Reconstruction and Development / The World Bank

1818 H Street, NW

Washington, DC 20433

Telephone 202-473-1000

Internet www.worldbank.org/rural

E-mail ard@worldbank.org

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ACRONYMS AND ABBREVIATIONS

A.P.	Andhra Pradesh	IVR	Interactive Voice Response
ASAL	Agricultural Sector Adjustment Loan	JLG	Joint-Liability Group
ATM	Automated Teller Machine	LIFFE	London International Financial Futures & Options Exchange
BBM	Brazilian Commodity Exchange	MFIS	Microfinance Institutions
CPR	Cedula de Produto Rural	MIS	Management Information System
CRMG	Commodity Risk Management Group	MT	Metric Tons
CSA	Customer Service Agent	NABARD	National Bank for Agricultural and Rural Development
DPL	Development Policy Lending	NFA	National Food Authority
EBRD	European Bank for Reconstruction and Development	NGO	Nongovernmental Organization
e-Trade	NFA Electronic System of Trading in Agriculture	NYBOT	New York Board of Trade
FAIR	Farmers Incentive Rice Purchase Program	OTC	Over-the-Counter
FOBB	NFA Farmers Option to Buy Back Scheme	PDA	Personal Digital Assistants
FOM	Farm Ownership Model	PIN	Personal Identification Number
GDP	Gross Domestic Product	POS	Point-of-Sale
GIFT	Grains Inventory Financing Technique	PRSC	Poverty Reduction Strategy Credit
IBD	International Business Division (ITC)	PRSP	Poverty Reduction Strategy Paper
ICT	Information and Communication Technologies	SAS	SugdAgroServ
IDRC	Canadian International Development Research Centre	SECO	Swiss Secretariat for Economic Affairs
IFC	International Finance Corporation	SHG	Self-Help Groups
IT	Information Technology	SME	Small and Medium Enterprises
ITC	Indian Tobacco Company	SMS	Short Message Service
ITF	International Task Force on Commodity Risk Management	TA	Technical Assistance
ITSL	Information Technology Solutions for Livelihoods	TIF	Transaction Insurance Fund
		UO	Unit Office
		WAN	Wide Area Network
		WHR	World Health Report

PREFACE AND ACKNOWLEDGEMENTS

This study of innovations in agricultural finance seeks to educate policy makers, task managers, and practitioners by highlighting major themes in agricultural finance from around the world and give some examples where these themes are being applied in attempts to extend agricultural finance. Because many of these case studies are in the nascent stages, a full analysis of their “success” cannot be made at this point in time. The paper attempts to address the outcomes to date, and where the case studies are sufficiently advanced, give an indication of their results. One of the key areas for future research is to evaluate the success of each of the case studies by looking at the administrative costs of each type of lending compared to an identified benchmark, and where subsidies are present, comparing the amount of subsidy per unit of commodity financed.

This study presents these topics and case studies through a specific lens by looking at two of the major constraints that are limiting the supply of agricultural credit in developing countries: 1) high levels of risk and limited risk management techniques and, 2) high transaction and supervisory costs.

This document has been produced by Ulrich Hess (task manager), Erin Bryla and John Nash, Commodity Risk Management Group, Agriculture and Rural Development Department of the World Bank. Contributors to the ESW include Anja Langenbucher, Eduardo de Sousa, Leora Klapper, Carlo Segni, Xavier Gine, Erin Bryla, Ulrich Hess, Hector Ibarra Pando, Olivier Mahul, Julie Dana, Ashley Hubka, Ornsaran Manuamon and John Nash. In addition, members of the ESW team from outside the World Bank include Laura Frederick, eChange LLC; James Dailey, Grameen Technology Center; and Nick Budd, Denton Wilde Sapte; Jacob Yaron, consultant; and Fernando L. Pimentel, consultant. Renate Kloeppinger-Todd contributed with comments and references. The peer reviewers for the document were Peer Stein, IFC, as well as Anjali Kumar and Priya Basu from the World Bank

The team wishes to acknowledge the generous support of the Swiss State Secretariat for Economic Affairs, SECO for pilot work in the areas of weather and price risk management that were background for one topic paper and two cases.

The paper is a synthesis document based on “Topic Papers” and “Case Studies” commissioned by the Commodity Risk Management Group, Agriculture and Rural Development Department of the World Bank. Much of the material in this document is drawn directly from these background papers.

EXECUTIVE SUMMARY

Financial market liberalization, innovations in the area of risk management, and reductions in transaction and supervisory costs have had significant positive impacts on agricultural finance institutions. Building on these positive developments, this study will attempt to contribute ideas based on recent experiences with innovation from developing countries in order to spur more innovations in rural finance.

This study focuses on four key areas where innovation could lead to greater access to agricultural finance: warehouse receipts and collateral securitization mechanisms; risk management products; supply chain finance; and technology. The paper describes the issues surrounding the themes and how innovative techniques can be used to overcome traditional barriers to providing financial services to agriculture by reducing either the risks associated with lending, the costs, or both. The diverse group of case studies and thematic discussions also underscore some key lessons regarding the role of government in its quest to lower costs and risk in the rural finance space.

1. OVERALL ECONOMIC POLICY ENVIRONMENT

Financial markets resemble other markets in that direct government involvement can crowd out private sector participation. This has been a perennial problem in developing countries' rural credit markets, where government agricultural banks offering subsidized credit were almost ubiquitous. This created a "chicken and egg" problem. Governments reluctantly withdrew from these markets because there was no private sector presence. The private sector was reluctant to enter when, in addition to other obstacles to rural lending, government competition was a constant threat. In recognition of this problem a new generation of government agencies were designed with the intention of coexisting with—or even "crowding in"—the private sector by filling niches or resolving what were seen as market failures by operating on a more commercial basis than their predecessors. Such an example is NAFIN, a government owned entity in Mexico which is presented in a case study on reverse factoring.

The potential for crowding out and the power of innovation can be seen in the case study on BASIX's use of index based weather insurance in India. Where crop insurance is heavily subsidized (i.e., priced at a less than actuarially sound amount) and provided by the state, this cannot only distort incentives and encourage excessive risk taking (example: United States), but can also crowd out private sector entry. BASIX's innovative weather insurance has grown despite a highly subsidized government insurance program that used to crowd out the private sector. But because of BASIX's innovative approach and the inefficiencies of the government run effort, such as two year delays in claim settlements and nontransparent criteria for payouts, an innovative private weather insurance market and lending tied to this insurance have continued to grow.

Agricultural sector policies may act to suppress private sector development. Governments often use state-owned enterprises to intervene in agricultural product pricing in order to, inter alia, reduce fluctuations of prices and provide a floor price. This can be very costly, is often ineffective and preempts development of both insurance and storage markets. Farmers will not hedge their production if there is a floor price. Since producers have little incentive to store crops if they do not expect prices to rise over time, the market for storage facilities (and therefore the emergence of a warehouse receipts system) will be suppressed if these price movements are prevented by government intervention.

In sum, an enabling environment for development of these markets must be one in which minimal government interventions are carried out on a commercial basis which allow markets to function freely. This in turn will provide an opportunity for financiers to provide finance without being encumbered by the government. It will also allow the provision of increased risk management services and ultimately lead to greater availability of credit.

2. LEGAL AND REGULATORY ENVIRONMENTS: ENFORCING CONTRACTUAL OBLIGATIONS

An enabling legal and regulatory environment is crucial for the development of warehouse receipts, other collateral mechanisms, and supply chain financing. National governments must provide an appropriate legal environment with respect to ownership rights, bankruptcy, and transferability of title documents. Two particularly important aspects are enforceability of contracts and timeliness of dispute settlement.

Enforceability

Receipts can function as alternative collateral only if they are transferable and are functionally equivalent to cash. If there is a possibility that the receipt could be invalidated or its liquidation could be tied up in legal wrangling, warehouse receipts system would not be established. In addition, for traders and other parties to provide supply chain financing, all parties involved must be forced to meet their obligations. The Clark Cotton case study from Zambia shows that Clark Cotton lends to farmers in order to access the physical cotton. If the farmer defaults on the physical supply obligation, the investment is practically lost. Without legal, social, or monetary consequences of default, supply chain financing would not be possible.

Timeliness

One of the key drivers of the system of the Cedula Producto Rural (CPR), a bond issued in order to obtain financing for production in Brazil is the ability of the buyer (i.e., holder of the receipt) to quickly settle disputes outside court system. In fact, the prospect of long delays in dispute settlement is enough to stifle the development of such a system.

3. INFRASTRUCTURE COSTS

Technology solutions require significant investment that can be costly and difficult to justify when implementation is risky, as is typically the case with technology activities. But investments in technology can be leveraged by financial intermediaries and others within the communities to provide additional services on the same platform. Sharing infrastructure such as power, telecommunication, data networks, hosting, application support or data management drives down the technology costs making it affordable to deliver financial products and services to rural areas. This idea of leveraging infrastructure can also be considered in the development of warehouses for collateral-based systems, weather stations for the development of index-based rainfall insurance, and physical infrastructure to facilitate improved functioning of the supply chain. Investment in infrastructure that can be leveraged, but requires high initial investment, could be supported by the public sector.

4. TECHNICAL ASSISTANCE AND CAPACITY BUILDING

Capacity building is important not only for the staff of banks and financial service providers, but for borrowers, and, in some cases, for governments as well. Capacity building for staff gives innovation a greater chance for successfully extending financing and creates staff ownership in the process, which can ultimately result in better performance. In both the CRDB case study on price risk management and the BASIX case study, capacity building for the staff of both organizations was a key element in the implementation and the take-up of the innovation.

Capacity building is also important for borrowers. In a number of the case studies, particularly the nonbank case studies, TA was highlighted as one of the core components of the model. The case study on NAFIN in Mexico reveals that the use and functioning of the electronic platform for reverse factoring and its outreach to small suppliers and buyers was attributable to the TA component of the operation. In addition, throughout each of the cases related to supply chain management (DrumNet, SAS [SugdAgroServ], and Clark Cotton), capacity building that focused on maximizing the impact of credit through improvements in product quality was essential to the operation. With respect to new instruments in risk management and insurance, borrowers need to be educated. There are many ways that organizations and producers can manage risk, and they should be given the capacity of managing risk in terms of selecting the correct tool or combination of tools that most efficiently and cost effectively match their risk.

Finally, governments will, in some cases, require assistance in capacity building or creating an appropriate legal or regulatory framework. This may include, for example, assistance in drafting appropriate legislation and regulations.

5. ORGANIZATIONAL CULTURE

A dynamic organizational culture allows staff to innovate and ensures the sustainability of innovation. The examples of BASIX and CRDB show organizations that train staff well and then provide innovative tools with which to work, while creating dynamic environments with appropriate incentives to motivate staff to work closely with clients. Management participation is crucial, particularly for the development and implementation of an innovative technology program. Other case studies (e.g., AgroSur and DrumNet) underscore the benefits of empowerment. People that have a stake in the business will make the business work.

6. WORLD BANK AND DONOR SUPPORT: FACILITATING MARKET DEVELOPMENT AND INNOVATION

All of these lessons have implications for the types of interventions by donors and government that can extend the reach of agricultural finance markets.

Policy dialogue

Creation of an enabling environment for rural finance should be a major focus of the rural development strategy of all developing countries. The Bank and other development partners should be cognizant of the linkages between financial markets. They should also be aware of the policies that are obviously targeted at these markets (e.g., government-provided credit, subsidized or controlled interest rates), as well as those with linkages that are not so obvious (e.g., commodity pricing policies). A strategy should consider the need for reforms in all these areas, and this should be taken into account in design of Poverty Reduction Strategy Paper (PRSPs), Poverty Reduction Support Credits (PRSCs), and Development Policy Lending (DPLs) in general.

Technical assistance

There is a need to bridge the capacity gap mentioned above. The Bank and donors can help to do this. While most capacity building in private businesses should generally be financed and organized by the businesses themselves, there may be a need for at least temporary donor support in low-income countries to provide a demonstration effect. Donors can play a role in capacity building and knowledge transfer with local banks, governments, and other actors within the marketing chain by providing legal and operational expertise. The experience of the Commodity Risk Management Group (CRMG) in the

Agriculture and Rural Development department (ARD¹) indicates that this can be a resource-intensive activity, but the potential results are significant.

Investment projects to overcome entry barriers

Bank strategy for rural finance has shifted substantially away from direct provision of credit through agricultural banks to supporting clients with best practices dissemination and capacity building at the legal, regulatory, and intermediary levels. Nonetheless, there may be opportunities for productive and efficient investment projects to support development of rural financial institutions and innovations.

There is a case for public intervention in seed financing innovation to overcome the entry barriers and generate benefits for everybody, particularly for investments with a strong public goods character. The case studies reveal how costly new, untested initiatives can be, especially in rural areas. Yet, once the innovation is successfully demonstrated, it or the successful aspects of the program could be widely replicated by others, reducing their costs or risks. Because they are not likely to capture the full benefits, often private sector actors in developing countries cannot, or are not willing to, overcome the costly barriers to innovation. The public good nature of innovation calls for public action. Table 1 in the Introduction section below illustrates how often the state, nongovernmental organizations (NGOs), or donors have filled that role. Such intervention, of course, must be designed and carried out in such a way as to “crowd in” the private sector, not displace it. In general, this will mean that support should come through subsidization of private sector activities rather than through direct public sector involvement. The case for public sector support is particularly strong where these new instruments will enable the government to disengage from other much less efficient forms of subsidization of rural finance.

It may also be worth exploring matching grant facilities targeted specifically at encouraging innovations. Such a facility could help overcome the public goods nature of innovations that lower transaction costs and risks for projects that can be copied by others if they are successful, preventing the innovator from capturing the full benefit of his risk and investment. Projects could also finance some of the shared or public infrastructure mentioned in the previous paragraph (e.g., weather stations). A number of other innovative projects are briefly described in Appendix 3.

In other cases, public investments are identified as necessary to provide public services that support private investment in innovation. For example, projects could help establish commodity markets and supply chains by financing, upgrading, or building of public testing or standards laboratories (Turkey Commodity Market Development LIL). Warehousing arrangements could also benefit from capital and TA from donor agencies using local banks as an agent or a cofinancier. Donor involvement would generate confidence in the system, which could facilitate greater investment of local banks and international financiers in World Health Report (WHR)-based credit lines. One example where this can be seen is a European Bank for Reconstruction and Development (EBRD)-sponsored warehouse receipts program in Kazakhstan. EBRD has provided more than 58 million Euros to be lent for preharvest and postharvest financing through local partner banks. Beyond providing the capital necessary to start the system, the International Finance Corporation (IFC) assisted these banks in drafting their credit procedures and provided TA on the legal framework and training for warehouse inspectors. The EBRD financed a similar project in Bulgaria in partnership with the World Bank (under an Agriculture Sector Adjustment Loan [ASAL]) and ACDI/VOCA, both of which supported the development of the policy environment and specific legal framework for warehouse receipts.

The case studies presented in this paper take an in depth look at the four key areas where innovation could lead to greater access to agricultural finance. A better understanding for how these innovative techniques can be used to overcome traditional barriers to providing financial services to agriculture is offered. Analysis of innovations in rural finance is worthwhile if improvements in agricultural finance are to be made.

1. INTRODUCTION

In many developing countries, risk management techniques are underdeveloped or insufficient for institutions to efficiently lend to activities in the agricultural sector. Information on borrowers' credit histories is rarely available, resulting in information asymmetries that make accurate credit risk assessment difficult. In addition, while agricultural client's major assets are production and land, it is often difficult for banks to use these as collateral, and particularly difficult to foreclose on land in case of default. Compounding this lack of traditional collateral is the presence of a high degree of covariate risk, in particular market price risk and weather risk. Banks lending to agricultural clients know that agricultural and rural revenues easily drop below break-even levels due to extreme weather events and price falls, which result in defaults and higher loan loss provisions, thereby making lending to agribusiness unprofitable.

The second major constraint in agricultural lending, high transaction and supervisory costs, is due to the particular risk, nature, and characteristics of the rural sector. In all financial markets, there is a trade-off between minimizing loan default and supervisory costs, but the nature of agricultural lending, especially through microfinance institutions, makes transaction costs and supervision costs disproportionately high relative to its urban counterpart. The small size of seasonal agricultural credit results in high due diligence costs per loan. The large geographical spread of customers, coupled with poor transportation and communication infrastructure, increase supervisory costs for financial institutions and compliance costs for customers. In addition, banks in rural areas find it difficult to attract qualified and trained loan officers.

High levels of risk and transaction and supervisory costs contribute to the absence of functioning rural financial markets and institutions in many countries. This lack of adequate financial services can also be partially attributed to the rapid disengagement of government as the primary source of agricultural lending in many post liberalization economies. When public sector banking institutions began pulling out of lending or changing their nature of operations, the private sector was expected to take over and offer credit in rural areas. But in many developing countries this space has not yet been filled.

Financial market efficiency is also often hampered by government regulation. For example, interest rate caps and other restrictive lending policies (even policies designed to direct lending into the rural sector) typically result in credit rationing to the largest, wealthiest, and most established farmers, and reduced availability of credit for the poorest farmers, such as smallholders or day wage laborers.

These factors combine to limit the supply of rural financial service in general, and agricultural finance in particular. Agricultural borrowers in rural areas adjust by resorting to informal credit, reduction of farm inputs, suboptimal production techniques, and borrowing from family and friends. This limits the investment in farm equipment and capital as well as other agricultural assets such as oxen. In addition, producers concentrate on low-risk, low-return activities because they cannot access the start-up capital required and cannot transfer systemic risks. The combined effect is to push producers into poverty. The challenge for agricultural financial institutions is to develop low-cost ways of reaching farmers (especially smallholders) and better manage risks involved in agricultural lending. On both fronts, new models for agricultural financing and new financial products are emerging. Table 1.1 illustrates the limitation in extending agricultural finance from the supply and demand perspective.

Table 1.1: Limitations in Extending Agricultural Finance from the Supply and Demand Perspective

<i>Financiers: The Supply Side</i>	<i>Agricultural Enterprises: The Demand Side</i>
<ul style="list-style-type: none">▪ Small size average farm, low population density, higher loan servicing costs due to limited volumes and high information costs.▪ Lack of collateral or adequate security.▪ Lack of technical knowledge at the bank level to evaluate and analyze the creditworthiness of agribusinesses.▪ No specialized product offered by the financial intermediaries to better meet the financing need of the agricultural sector: rural sector requires preharvest financing to buy inputs that can only be repaid after harvest and show much more uneven cash flows than urban borrowers, leading to repayment in less frequent installments, which increases the risk and monitoring costs for financiers.▪ No branches or limited network in rural areas, thus difficulties to reach and market to farms.▪ Risk correlation when lending to farms: all borrowers are affected by the same risk, such as low market prices and reduced yield due to weather.▪ Underdeveloped communication and transportation infrastructure.	<ul style="list-style-type: none">▪ Agribusinesses suffer from poor, insufficient collateral and non enforceability of security due to lack of land and property rights, high costs, and lengthy or lacking registration and foreclosure processes.▪ Low affordability for farmers of market interest rates and higher margins (up to 2% higher than standard SME loans) that reflect the risk adequately.▪ Insufficient cash flow planning; farms are not obliged to keep accounts or financial statements; cash flows are hard to assess when clients sell directly to consumers.▪ Repayment schedules are often difficult for the clients to meet-standard repayment schedules are not adapted to seasonality of the business.▪ Lack of legal education at the farmers' level.▪ Farms are often successors of cooperatives, which are rather complex to deal with.▪ Lack of initiative and articulated demand for finance by agribusinesses, especially in primary agriculture.

Source: Langenbucher 2005.

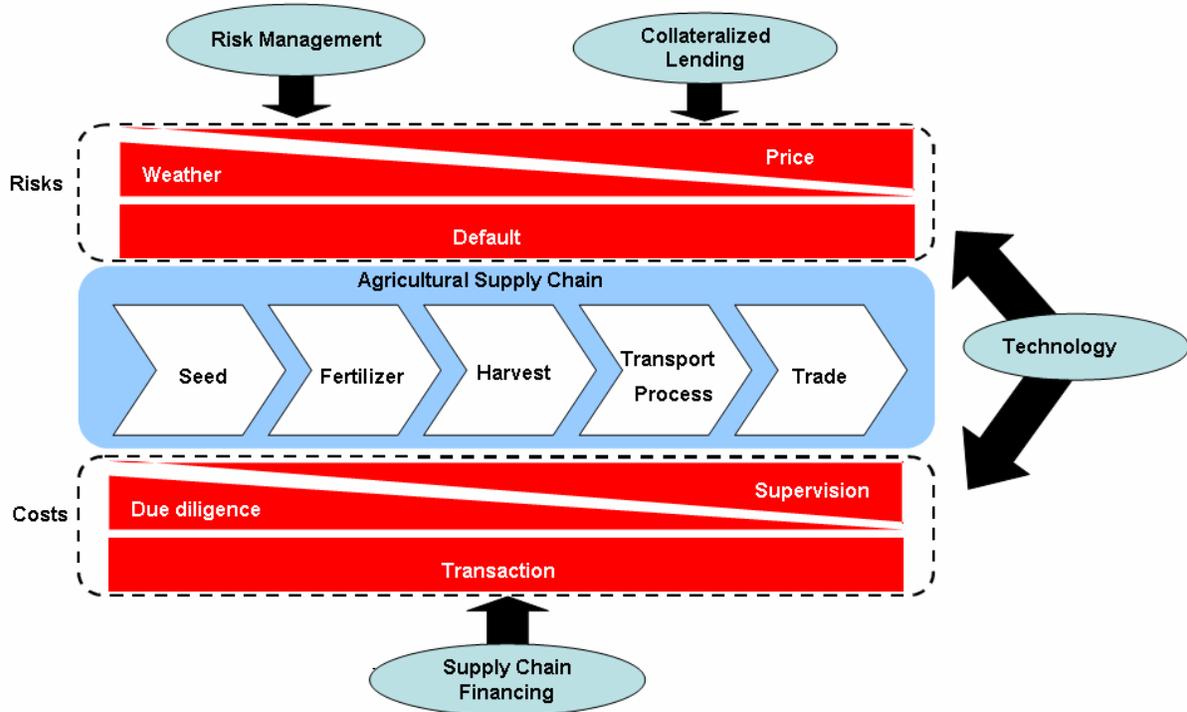
We have identified four topics in agricultural finance where innovations are emerging: warehouse receipts and collateral securitization mechanisms; risk management products; supply chain finance; and technology.

This study is designed to present a menu of success stories, lessons learned, and approaches. While this paper will attempt to cover all of these topics and give some brief overview of these concepts, it is in no way comprehensive and does not attempt to give an in-depth picture of every topic and case study in agricultural finance. It will explore the different ways in which to improve risk assessment and management and reduce transaction and supervisory costs, thereby broadening and deepening access to agricultural finance.

For each of the four major themes, diagramed in Figure 1.1, the paper will attempt to describe issues surrounding the theme and how innovative techniques can be used to overcome traditional barriers to providing financial services to agriculture by reducing either the risks associated with lending, the costs, or both. Each section will identify the prerequisites and challenges for greater use of this vector of

innovation, and summarize what can be done to support this type of innovative activity. The case studies have been chosen to support and show success stories within each of these themes.

Figure 1.1: Four approaches to lowering costs and risks in agricultural lending



Source: Authors

The material offered in this paper is meant to be a synthesis of the background papers and serves to give a general overview of all topics. Individuals can learn more about the topics they are most interested in by referring to the background paper. These background papers provide a detailed resource on each of these themes and case studies. The topic papers take a “horizontal” cut, exploring each of the four themes of innovation: collateral securitization mechanisms; risk management products; supply chain financing; and the role of technology in the extension of agricultural credit. The case studies document the successful innovation(s) of a single institution, system, or country. We encourage readers to use the synthesis paper as a general resource and draw upon the detailed topic papers and case studies to find more specific information. Table 1.2 summarizes the case studies and how these different approaches could impact the availability of agricultural lending. The table also highlights how each of these case studies address the issues of risk mitigation and cost reduction.

Table 1.2 Different approaches to extending access to agricultural finance

<i>Case Study</i>	<i>Innovation</i>	<i>Country</i>	<i>Government / Donor Support</i>	<i>Limitation Addressed</i>	<i>Reduces Cost</i>	<i>Mitigates Risk</i>	<i>Culture of Innovation</i>
Production/ Input							
DrumNet	Supply chain financing and technical assistance (TA)	Kenya	Donor	<ul style="list-style-type: none"> • Geography, information asymmetries 	<ul style="list-style-type: none"> • Aggregates' costs of supply chain 	<ul style="list-style-type: none"> • TA to improve yield and quality • Access to premium markets 	<ul style="list-style-type: none"> • Grower relationships and TA
Clark Cotton	Supply chain financing	Zambia	No	<ul style="list-style-type: none"> • Geography, information asymmetries 	<ul style="list-style-type: none"> • Aggregates' costs of supply chain 	<ul style="list-style-type: none"> • Constriction point—farmers are obliged to deliver to Clark Cotton 	
BASIX	Weather insurance, Portfolio Manager	India	Donor	<ul style="list-style-type: none"> • Weather risk, geography 	<ul style="list-style-type: none"> • Mobile technology 	<ul style="list-style-type: none"> • Insurance • Guidelines for lending and portfolio • Group lending 	<ul style="list-style-type: none"> • Management promotes staff development and innovation • Focus on livelihoods
SudAgroServ	Supply chain financing with farmer ownership	Tajikistan	Donor	<ul style="list-style-type: none"> • Geography, information asymmetries 	<ul style="list-style-type: none"> • Aggregates' costs of supply chain 	<ul style="list-style-type: none"> • TA to improve yield and quality • Access to premium markets 	<ul style="list-style-type: none"> • Farmer ownership creates grower incentives
Indian Tobacco Company	Mobile marketing	India	Parastatal company	<ul style="list-style-type: none"> • Information asymmetries 	<ul style="list-style-type: none"> • Mobile technology 		

Table 1.2 Different approaches to extending access to agricultural finance

<i>Case Study</i>	<i>Innovation</i>	<i>Country</i>	<i>Government / Donor Support</i>	<i>Limitation Addressed</i>	<i>Reduces Cost</i>	<i>Mitigates Risk</i>	<i>Culture of Innovation</i>
Fondos	Risk pooling + reinsurance	Mexico	State insurance company	<ul style="list-style-type: none"> • Weather risk 	<ul style="list-style-type: none"> • Risk pooling 	<ul style="list-style-type: none"> • Reinsurance to protect against covariant and extreme risks • Joint liability mitigates asymmetric information and moral hazard 	<ul style="list-style-type: none"> • Government supports less costly alternative to state insurance • Community responsible for administering payouts
Postharvest							
CRDB Ltd.	Price risk management, relationship managers	Tanzania	Donor	<ul style="list-style-type: none"> • Price risk and weather risk 		<ul style="list-style-type: none"> • Collateral management • Price risk management • “Hands-on” approach with clients 	<ul style="list-style-type: none"> • Management promotes staff development and innovation
Cedula de Produto Rural (CPR)	Farm bond (CPR)	Brazil	State	<ul style="list-style-type: none"> • Contractual obligations and the legal system 		<ul style="list-style-type: none"> • Provides liquid collateral • Lenders can hedge price risk • Out of court settlement 	<ul style="list-style-type: none"> • Dynamic contract development

Table 1.2 Different approaches to extending access to agricultural finance

<i>Case Study</i>	<i>Innovation</i>	<i>Country</i>	<i>Government / Donor Support</i>	<i>Limitation Addressed</i>	<i>Reduces Cost</i>	<i>Mitigates Risk</i>	<i>Culture of Innovation</i>
Receivable							
Nacional Financiera , SNC (NAFIN)	Reverse factoring (NAFIN)	Mexico	State	<ul style="list-style-type: none"> • Delays due to distance and contractual obligations 	<ul style="list-style-type: none"> • Receivables management • E- platform • Competition for lending 	<ul style="list-style-type: none"> • Assesses only the creditworthiness of large buyers instead of small and medium enterprises (SMEs) 	<ul style="list-style-type: none"> • E-government

Source: Authors

2. WAREHOUSE RECEIPT FINANCING AND RELATED COLLATERALIZED LENDING MECHANISMS

International trade in agricultural goods continues to expand, while at the same time traditional and innovative collateral securitization mechanisms develop to finance these trade flows. Emerging markets, however, have not benefited as much from the increase in trade flows and alternative financing mechanisms as developed countries. Warehouse receipt financing and other related collateralized lending mechanisms can provide an alternative to traditional lending requirements of banks and other financiers and are particularly relevant for emerging economies.

The concept of warehouse receipt financing is not new and on the face may not be viewed as an innovation. However, what is innovative is the use of warehouse receipts as a catalyst to extend financing in markets where other attempts have failed, as well as the creative use of the basic principle behind warehouse receipts - collateralized lending - in order to design new financing instruments. This section will define briefly what warehouse receipt financing and other alternative collateralized lending mechanisms are and give some of the basic prerequisites for their use and development. This section will also attempt to show how these instruments can play a key role in extending finance where other instruments have failed.

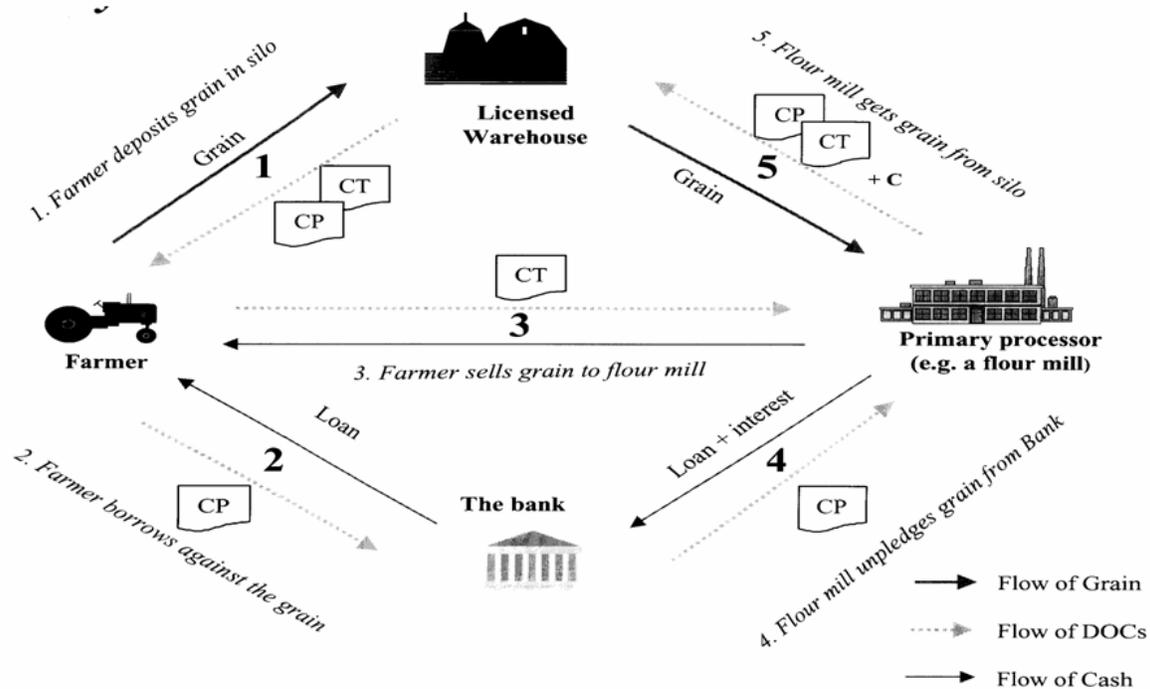
WAREHOUSE RECEIPT FINANCING

The basic rationale behind any collateralized commodity transaction is a structural risk change for the lender: instead of lending money based on the strength of a company's balance sheet when issuing a corporate loan and hence taking credit risk, the lender now takes performance risk. But through warehouse receipts, even performance risk is minimized because the lender has the ability to sell off the asset in case of nonperformance. In traditional secured lending, the underlying collateral is the second source of repayment that needs to be mobilized when something goes wrong; in collateralized commodity lending, it is the first source of repayment. Rather than relying on the borrower's willingness to repay the loan and his existence as a going concern, the lender relies on the borrower's ability to conduct the underlying commodity transaction and has the possibility to sell off a very liquid asset, namely the commodities, as soon as the loan is in default.

In warehouse receipt financing in the agricultural sector, the underlying collateral is soft commodities such as grain, cotton, coffee or cocoa. Figure 2.1 displays the basic mechanism of the financing cycle. After harvest, the commodities are stored in a licensed warehouse that issues a receipt proving that the commodities are received and physically in the warehouse. This receipt forms the basis of the financing. The legal form of the warehouse receipt depends on the countries' respective regulatory environment. Ideally, the warehouse receipt consists of two parts: a certificate of pledge and a certificate of title. When issuing the certificate of pledge to a lender, the farmer, trader, or agricultural company is able to take out a loan: he borrows against the collateral, hence the commodities and hereby covers his working capital needs. Lenders usually advance funds as a specified percentage of the value of the underlying commodities. This percentage needs to account for the costs that lenders have to incur when selling the commodities in case of a loan default, as well as the potential value decrease caused by price volatility in the respective commodity market. Subsequently the farmer sells his commodities either to a trader or a primary processor; to validate this sale he transfers the certificate of title. The buyer eventually pays back

the loan plus interest directly to the lender and receives in exchange the certificate of pledge that had been deposited with the lender when the loan was issued. Once the buyer has both, the certificate of title and the certificate of pledge, he can release the commodities from the warehouse.²

Figure 2.1: Incorporating Warehouse Receipts in the Financing Cycle



Source: Bryde and Martin (1999)

RELATED COLLATERAL LENDING MECHANISMS

Warehouse receipts are the basis for collateralized commodity transactions. More complicated structures can be observed in developed markets, such as special purpose vehicles that issue commodity backed securities, which are then credit enhanced by a financial institution to achieve investment grade rating. The following overview of some other forms of collateral-financing schemes indicates that there are many ways to deepen collateralized agricultural finance structures alongside the development of more sophisticated financial markets.

“Repos”

Repurchase agreements (“repos”) are simple forms of commodity finance: the bank, rather than taking a pledge over the goods being stored or shipped, actually *buys* the goods and simultaneously signs a contract for resale at a certain point in time and at a price that reflects the cost of funds from the original time of sale to the resale. Repo finance for agricultural commodities has spread to over a dozen countries in recent years and is particularly popular in jurisdictions that do not allow for adequate laws and regulations regarding the registration of pledges, as well as enforcement and foreclosure mechanisms.

Export receivables financing

In export receivables financing, funds are disbursed to an exporter against assigned off-take contracts of commodities. There are many ways to structure an export receivables deal, which range from a very secure transaction to a rather loose arrangement based on letters of credit. In a simple example as conducted by IFC in Argentina, the exporter assigns its receivables to a local bank that acts as an agent.³ IFC and a syndicate disbursed funds to the agent bank, which in return disbursed funds to the company for working capital purposes. The off-taker, hence importer of the exported commodities, paid for the purchase directly to the agent bank, which in return serviced the IFC loan out of these proceeds.

Factoring

Factoring is generally understood as a supplier assigning receivables from contracts of sales of goods made between the supplier and a customer to a factor. The factor can provide finance for the supplier through loans and advance payments and also provide other additional services. As a result, a supplier can sell its creditworthy accounts receivable at a discount in order to receive immediate cash and hence get immediate working capital financing. As in other collateralized structures, factoring shifts the risk away from a potentially high risk supplier - that needs the financing - to a low risk off-taker who stands behind the accounts receivables.

Islamic trade finance

Trade finance structures in accordance with Islamic banking standards have been growing considerably in importance over the last few years and are expected to become even more critical in the future. With Islamic banking, banks need to earn their profit not simply because they make money available, but because they take a production or trade-related risk; that is, the lender must share in the profits and losses arising out of the enterprise for which the money was lent. The so called *Murabaha* is a technique widely used for commodity transactions. Under this structure, an Islamic bank would purchase the commodities in its own name and then sell them on to the end buyer at an agreed mark-up.

EXTENDING AGRICULTURAL LENDING THROUGH COLLATERALIZED LENDING

Most of the traditional barriers to accessing postharvest finance can be tackled and at least partly overcome by structured commodity finance approaches based on warehouse receipt financing. Table 2.1 summarizes the main obstacles and sums up in which way warehouse receipt financing addresses those issues.

The advantages and versatility of warehouse receipts make them particularly relevant for emerging economies. In all countries, but particularly in challenging markets, it is easier to handle security given in the form of a possessory pledge, dealing with incontestable identity of collateral, as opposed to disputing ownership or competing over claims. In case of a loan default, the collateral is covered and can be auctioned off and sold at relatively low costs to a liquid market. The holder of the warehouse receipt has a claim against the issuer, hence the warehousing company, and the borrower in case of nonexistence or unauthorized release of the collateral. In some countries the existence of competing creditors and unpaid sellers is often difficult to verify, having a document of title to goods in store can cut off claims of such competing creditors.

Because of the easy recourse and the ability to sell a liquid collateral asset in case of default, warehouse receipts-based lending lowers the risk and reduces typical transaction costs of commodity transactions, such as high loan servicing costs due to limited volumes, high information costs, and high supervision costs. Borrowers do not need a balance sheet or long credit history because the lender is not relying on the company as a going concern, but on the value of the commodity. Thereby, lending costs for financiers are

reduced, which, as a result, brings down interest rates for borrowers in sectors that are seen as high risk in any economy - commodity production, processing, and trade - but which are of great importance for an emerging or transition country. A warehouse receipt-backed transaction allows a financier to shift his risk away from the borrower to a liquid asset and, in some cases, to even enhance it further through the creditworthiness of a strong off-taker.

From a lender's perspective, warehouse receipts allow the type of asset pledged - agricultural commodities - to match the type of financing offered - working capital financing. In those cases where banks take fixed assets as collateral for the production of agricultural commodities, there is a mismatch between the loan and the underlying asset. Fixed assets are more appropriate collateral for long-term financing, where lending maturities would match asset type. In the absence of warehouse receipts, the farmer will pledge fixed assets, such as land, house, and equipment, or whatever he has to offer to obtain production finance. This leaves the farmers without any assets to pledge and unable to access long-term financing when they want to make a capital expenditure investment as their fixed assets are already being pledged for working capital purposes. Hence, the farmers are confined to their current production volumes and cannot grow.

Table 2.1. Impact and Mitigation of Barriers to Agricultural Credit through Warehouse Receipts

Barrier	Impact	Mitigation
<p>High transaction costs for rural credit lead to high borrowing costs for farmers for working capital needs or long term financing.</p>	<ul style="list-style-type: none"> • Low liquidity forces farmers to sell commodities right after harvest when prices are low to cover working capital needs. <p>Long-term financing cannot be obtained and capital intensive investments, such as upgrading equipment, cannot be done, hampering the growth and asset-building capacity of the farmer.</p> <p>As the farmer is forced to pledge fixed assets to obtain working capital financing, long-term financing cannot be obtained due to a lack of collateral that is free of liens and can be pledged. Capital-intensive investments, such as upgrading equipment, cannot be afforded, hampering the growth and asset-building capacity of the farmer.</p>	<ul style="list-style-type: none"> • Warehouse receipt financing enables farmers to borrow against grain stored in licensed warehouses. As the financier is in possession of a very liquid asset, the underlying balance sheet becomes less relevant; transaction and borrowing costs are decreased and the farmer receives much needed liquidity for working capital. • Once a stable relationship between the farmer and a financier is established, information costs are diminished and transaction costs for the financier to provide long-term loans decrease.
<p>Lack of funds results in vicious cycle for farmers, processors, and traders.</p>	<ul style="list-style-type: none"> • Farmers are forced to sell grain after harvest for lack of working capital. Smaller traders cannot prefinance farmers and are forced to sell on to processors immediately. Processors must store high value commodities and lack liquidity as well as resources to invest in more efficient production upgrades, as capital is tied up in inventory. As a result, processors are less efficient, have higher production costs, and buy less from farmers, which aggravates the liquidity crunch. • As a result, emerging economies suffer from a poor commodities sector and inadequate involvement in international trade. 	<ul style="list-style-type: none"> • Warehouse receipt financing tackles the working capital needs of farmers, hence breaking the cycle after harvest. By injecting more liquidity into the system, each player along the supply chain benefits and has more resources to accommodate for capital intensive investments.
<p>Underdeveloped warehouse industry</p>	<ul style="list-style-type: none"> • Warehouses of inadequate quality lead to a lack of trust of potential financiers with regards to the maintenance of the 	<p>In a successful warehouse receipt system, warehouses must be licensed, monitored, and inspected. This ensures a</p>

Table 2.1. Impact and Mitigation of Barriers to Agricultural Credit through Warehouse Receipts		
Barrier	Impact	Mitigation
	<p>collateral quality.</p> <ul style="list-style-type: none"> • If a warehouse defaults, the financier cannot be certain that he gets reimbursed for his loss. 	<p>minimum standard of quality that should be transparent for and accepted by all players involved.</p> <p>In a successful warehouse receipt system, warehouse performance is guaranteed by an indemnity fund or insurance bonds</p>
Strong price fluctuations throughout the year	<ul style="list-style-type: none"> • Through the uncertainty and short planning horizon of all players involved and the strong seasonality of selling patterns (farmers sell commodities right after harvest), prices are more volatile throughout the year. 	<ul style="list-style-type: none"> • Warehouse receipts help reduce those fluctuations throughout the year by injecting more planning into the system. In addition, they lay the foundation for more sophisticated products, such as derivatives and hedging contracts.
<i>Source:</i> Langenbucher 2005		

NECESSARY PREREQUISITES AND CHALLENGES

In order for a warehouse receipt or collateralized lending program to be effective, there are a number of prerequisites for its functioning:

Legal system

An appropriate legal environment, which ensures easy enforceability of the security, clearly defines the rights and duties of each party, and foresees transferability of the receipt by delivery or endorsement, has to be in place. The legislation shall clearly make warehouse receipts functionally equivalent to cash. There are different schools of thought as to whether the appropriate legal environment can be achieved by the creation of a specific warehouse receipt code, or as an amendment of sections to the commercial code. Evidence to date suggests that the first route is preferable.

Market place

Financiers are only likely to engage if the value of commodities can be assessed in a more or less transparent market. Furthermore, they need to be assured that there is a way to liquidate commodities in case of a loan default. Both require the existence of a functioning market place.

Agricultural prices that reflect carrying costs

In a highly regulated agricultural market where the government intervenes on a regular basis, agricultural prices are artificial. In this case, the potential benefit to a producer - to profit from higher prices as he can choose to sell when market conditions are best - becomes unlikely and his incentive to sell immediately after harvest is presumably higher than his hope for prices to increase in the coming months, which renders a warehouse receipt system superfluous.

Low financing ratios due to commodity price volatility

Banks finance the commodities behind the warehouse receipt at a discount relative to their current market value. This “financing ratio” can be as low as 60 percent for more volatile commodities, as lenders mitigate the risk of price falls that erode the quality of the collateral. Banks can increase the financing ratio though by hedging the price risk at or just below market value on behalf of the borrower for a fee that reflects the hedging costs.

Warehouses

The quality of warehouses plays a pivotal role in the functioning of a warehouse receipt system. Ideally, warehouses are private and run on a commercial basis. There has to be a licensing and monitoring procedure in place that guarantees minimum quality standards. While warehouse ownership should generally be private, the licensing procedure can be undertaken by national public authorities or subcontracted to private companies. Once warehouses have been licensed, monitoring needs to take place on a regular basis to ensure the minimum financial, technical, and administrative standards of the warehouses. If these standards are accepted and transparent to all participants in the system, receipts issued by licensed warehouses can be treated as cash equivalent.

Performance guarantee

An indemnity fund or bonding should be established to cover any potential fraud or negligence by the licensed warehouses. In case a warehouse is not able to deliver the goods upon presentation of a receipt, the financier can call on the indemnity fund or the bond to cover the loss.⁴

Local Banks

Local banks play a very important role in the successful set up of warehouse receipt systems (UNCTAD 2001). Banks provide local expertise on the national commodity sector, can act as a local agent for the involvement of finance from international financiers, often have existing outreach into the rural areas, and in many cases could provide financing or cofinancing for warehousing arrangements. In addition, their presence builds confidence for international banks while at the same time strengthening the expertise of the local financial sector. Integrating the local financial system into the scheme from the beginning increases the sustainability of the system without the participation of donors.

Appendix 1 offers additional insight by exploring the preconditions and challenges to developing warehouse and collateralized lending systems in the Philippines.

CASE STUDY: TRADABLE RECEIPT FINANCING - THE CEDULA DE PRODUTO RURAL IN BRAZIL

Risk Reduction:

- Provides alternative, liquid collateral
- Lenders can hedge price risk
- **Out of court settlement for contracts**

Culture of Innovation:

- Government adapts contract to meet the needs of buyers and sellers
-

Agribusiness in Brazil represents almost 30 percent of gross domestic product (GDP), of which 10 percent of GDP is directly derived from the agricultural sector. Brazilian agribusiness generates approximately 40 percent of total exports. Due to a combination of yield gains and land expansion, grain production has more than doubled and livestock production has nearly tripled over the past 15 years in the country. Brazilian agriculture has been facilitated by Brazilian agricultural policy that evolved from protectionist import substitution policy in the late 1970s, characterized by abundant subsidized credit and minimum price guarantees, to a gradual liberalization in the 1990s. In addition to the benefits of a stable economy sparked by the "Plano Real" of 1994, key success factors for the agriculture sector were the securitization of outstanding rural debts, the repositioning of the state, which began to act in a more localized and transparent manner, and the privatization of agricultural finance and marketing. However, formal and secure mechanisms and guarantees were lacking for the securitization of agricultural lending and therefore the Cedula de Produto Rural (CPR) was created.

Innovation

The CPR is a bond issued by rural producers, farmers' associations, and cooperatives in order to obtain financing for production. Currently, three types of CPR are available in the market, each of which have different risk characteristics for sellers (farmers) and buyers.

Physical CPR. The physical CPR was the first of the CPR products designed and it operates much like a forward contract, with the exception that payment for the goods is made when the bond is issued, not at delivery. The producer receives cash (or inputs) upon the issuance and selling of the bond for their physical product and has the obligation of delivering an agreed amount of rural production at an agreed location and future date. Premiums and discounts are expected in case of the delivery of different quality. In this way, the physical CPR provides crop financing for the production of the crop - or livestock - and also manages the producer's price risk by linking the debt to the physical product. Traders and agroindustry also benefit through the guarantee and better planning of the supply of the commodity.

Financial CPR. This CPR does not call for the physical delivery of the product, but is cash settled. The obligation of the physical delivery of the product to settle the operation discouraged the participation of financial investors. If fund managers weren't able to resell the CPR to a trading company at a reasonable price (in order to leave its "long" position), they would take the risk of receiving, for instance, 10,000 heads of cattle or 20 trucks of soybean in front of their offices. The switch to cash-settled CPRs led to a huge increase in operations. This new contract is more advantageous to the buyers as it leaves market price risk of the underlying commodity with the supplier.

CPR indexed to futures. Banco do Brasil further refined the financial CPR by creating a CPR indexed to the futures market. Contract settlement is based on a local or foreign futures market reference price⁵ or the price calculated by a reliable source, such as a university. In this case, the settlement is based on the amount of production established on the bond, multiplied by the agreed upon reference price at the time of settlement. The indexed CPR, like the physical CPR, brings benefit to the seller because it transfers the price risk to the buyer while at the same time allows the buyer of the CPR to settle the contract financially, the key element of the Financial CPR.

Performance

Over a period of 10 years, approximately 130,000 CPR contracts financing more than US\$2.5 billion were negotiated through the formal banking system. Up to US\$5 billion are negotiated "over-the-counter" every year. Main beneficiaries are the producers of soybean, coffee, and cattle. Its significance can be described as follows:

The instrument has become a relevant financing and commercialization mechanism for producers of various sizes in Brazil, especially for medium and large-sized producers.⁶ The instrument has proven to be extremely versatile as to its nature (CPR - physical, cash settlement, or by index) and applications. The consolidation of the instrument has allowed for the generation of new, innovative, spin-off financial mechanisms, drawing new agents into the system and increasing liquidity. Online posting and trading of CPRs on the Brazilian Commodity Exchange (BBM) introduced agricultural transactions as an asset class even to private individuals, thanks to Banco do Brazil guarantees.

Risk and Cost Reduction

The most important attribute of the CPR is, by far, the reduction of risks to the buyers. As stated in the law, CPR is a bond that provides for out-of-court dispute settlements; in other words, the bond guarantees rapid execution in case of nonperformance or breach of contract on the part of the bond issuer, and therefore avoids endless discussions in the courts about the merit of the loan. This characteristic is definitely a major incentive for the buyers of CPRs, as it reduces risks of moral hazard and it speeds the recovery of the loans when needed.

It is also important to mention that a large share of CPRs are negotiated in an environment that guarantees the visibility, transparency, and security of the operations. These are fundamental requirements for incorporating financial agents, as well as for reducing the costs involved. At the initiative of Brazilian Futures Market and seven regional commodity exchanges, the Brazilian Commodity Exchange was created, which has as its objective the generation of an electronic registration environment and clearinghouse for the transactions with agricultural contracts, including the CPR operations. This system permits electronic access to information and business opportunities to nearly 400 traders throughout Brazil. Through this system it is possible to offer and buy contracts, register the operations, and guarantee the custody of the bonds. Up to the end of October 2004, nearly 70,000 contracts had been registered with BBM, with a total financial volume of approximately US\$900 million (in little less than one year of operation). One of the major advances of the BBM system is that it permits potential investors to see the bonds that are guaranteeing their operations.

Sustainability and replicability

While the CPR system has been successful in Brazil, there are three key lessons that will influence the growth and development of the CPR and its applicability for other countries and other sectors:

Cultural resistance should not be underestimated; farmers are by nature speculators, as a result, it is difficult to get them to enter into a CPR that locks in their prices.

Problems of breach of contract can occur, principally with the physical CPR when prices rise. Because of this, the judicial sector must be prepared to guarantee success of the suits. The development of a sustainable and accessible agricultural and credit insurance would also mitigate risks.

The original CPR contract did not meet the need of all the market participants, as a result it was essential that the market be dynamic enough to create a contract that fits the needs of the participants.

CASE STUDY: THE USE OF REVERSE FACTORING TO PROVIDE FINANCE—NAFIN IN MEXICO

Cost Reduction	<ul style="list-style-type: none">• Provides for receivables management• E- platform cuts transportation and time investment for transaction• Lenders compete for business
Risk Reduction:	<ul style="list-style-type: none">• Lenders must only assess the creditworthiness of large creditworthy buyers instead of small risky SMEs
Culture of Innovation:	<ul style="list-style-type: none">• Government pursues e-government to develop electronic platform

NAFIN was created by the Mexican government in 1934 as a state-owned development bank with the goal of providing commercial financing. When a new government was elected in 2000, NAFIN was given new management and direction with the goal to use new technology to provide small and micro enterprise loans and complement lending with greater training and technical assistance. In Mexico, about 99 percent of registered firms in the formal economy - about 600,000 firms - are classified as small and micro enterprises. "In 2004, the typical small Mexican firm received less than 17 percent of its financing from banks - instead depending on family savings and other personal funds - and almost 80 percent of small firms received no bank credit (Banco de Mexico 2004)." In response to this lack of financing in the formal sector and the mandate given to it after the 2000 elections, NAFIN developed and began operating its electronic platform for reverse factoring through a program called "Cadenas Productivas," or "Productive Chains," in order to provide greater opportunity for small suppliers to access working capital.

Innovation

The aim of NAFIN's reverse factoring program is to create linkages between small suppliers and “Big Buyers.” The big buyers are large, creditworthy firms that have low credit risk. The suppliers are typically small, risky firms that generally cannot access any financing from the formal banking sector. The NAFIN reverse factoring program allows small suppliers to use their receivables from big buyers to receive working capital financing, effectively transferring their credit risk to their high-quality customers, and thereby getting access to more and cheaper financing.

In order to understand reverse factoring, it is first important to understand the mechanics of ordinary factoring (see box 2.1). In factoring, the underlying assets are the seller's accounts receivable, the funds due to a seller after already having sold and shipped a product to a buyer. The accounts receivable are purchased by the “factor,” usually a bank or other lender, at a discount. When payment for those accounts receivable is received from the buyer, the factor deducts the amount that is owed and the remaining balance is paid to the seller, less interest and service fees.

In emerging markets, factoring has not made significant inroads due to a lack of sufficient credit information about the sellers and the prevalence of fraud, such as bogus receivables, nonexistent customers, and so forth. As a result, NAFIN has used reverse factoring to overcome these obstacles. In reverse factoring, the lender purchases accounts receivable only from high-quality buyers. Therefore, the lender only needs to collect credit information and calculate the credit risk for large, very transparent, internationally accredited firms. In this case, the suppliers are risky SMEs and the buyers are large, creditworthy firms. In reverse factoring, however, the credit risk is equal to the default risk of the high-quality customer, and not the risky SME. To reduce costs and speed transactions, NAFIN's factoring transactions are executed through an electronic platform that provides online factoring services. This electronic platform also facilitates competition among banks to factor a supplier's receivable.

NAFIN, as an additional service, provides contract financing for up to 50 percent of confirmed contract orders from big buyers for NAFIN suppliers. Because NAFIN requires no collateral, charges no fees, and provides this finance at a fixed interest rate, this service provides SME's access to sufficient working capital to fulfill the order.

Performance

NAFIN has succeeded in providing financial services to Mexican SMEs. As of mid-2004, NAFIN had established Productive Chains with 190 big buyers (about 45 percent in the private sector) and more than 70,000 small and medium firms (out of a total of about 150,000 participating suppliers). About 20 domestic lenders are participating, including banks and independent finance companies, which have extended more than US\$9 billion in financing since the program's inception in September 2001. NAFIN has brokered over 1.2 million transactions – 98 percent by SMEs - at a rate of about 4,000 operations per

Box 2.1. The Mechanics of Factoring

- *Step 1:* Small Supplier, S, sells 1 million dollars in tomatoes to its customer Big Buyer, B, a large multinational exporter. S, in a competitive gesture, offers B 30-days trade credit. S records the sale as US\$1 million in accounts receivable and B records the purchase as US\$1 million in accounts payable.
- *Step 2:* S needs working capital to produce more inventory. A factor, F, purchases S's accounts receivable (S “assigns” its accounts receivable from B to F). S receives today 70 percent of the face value of the accounts receivable (US\$700,000). B is notified that S's receivables have been factored.
- *Step 3:* In 30 days, F receives the full payment directly from B, and S receives the remaining 30 percent less interest (on the US\$700,000) and service fees.

Source: Klapper 2005.

day. The following sections discuss the mechanics of the NAFIN program and its benefits to small suppliers, big buyers, and lenders.

Risk and Cost Reduction

Factoring is an ideal source of financing in countries with small, risky suppliers and large and foreign buyers. However, successful factoring programs require government support in setting up a legal and regulatory environment that allows a secure and electronic sale of receivables.

Lenders. Because reverse factoring, as opposed to ordinary factoring, requires that lenders only find information on the creditworthiness of one or two large firms, the lender benefits from low information costs and credit risk. Lenders can develop new relationships with suppliers, build a credit history on firms, and cross-sell other products. In addition, lenders can diversify their portfolio across industries and increase their lending without increasing their risk.

Small supplier. The NAFIN factoring program provides small suppliers with instant liquidity and allows these businesses to grow with funds that were previously tied up in receivables. By transferring the credit risk of the loan to the suppliers' high-quality buyers, NAFIN can offer factoring without recourse to SMEs, even those without credit histories. In addition, NAFIN charges no commissions (to the seller) and offers capped interest rates. The competitive structure, which allows lenders to compete for suppliers' receivables, allows firms to pick their own lender and, through competition, reduce costs. Factoring also reduces transaction costs associated with managing a loan for small suppliers. Previously many rural SMEs needed to travel to customers in the city to present bills, collect payments, and pay suppliers. By factoring its receivables, the supplier eliminates its collection costs by outsourcing its receivables' management.

Big buyer. The benefit to the buyer is that the lender provides receivables' management and the buyer often develops stronger relationships with its suppliers. For instance, buyers decrease their administrative and processing costs by effectively outsourcing their payment department, for example the buyer writes one check to a bank rather than to hundreds of suppliers. By providing its suppliers with working capital financing, buyers can improve their reputation and relationship with suppliers as well as reduce their own borrowing costs by extending their payment terms with suppliers.

Sustainability and Replicability

The NAFIN factoring program is used as a model in Mexico for the automation of other government agencies and service providers. The success of the NAFIN program depends on the legal and regulatory support offered in Electronic Signature and Security laws that should be a model for other developing countries.

NAFIN has entered into an agreement with a development bank in Venezuela to develop a similar product and the model is being considered for replication in other Latin American countries, such as Argentina, Chile, Costa Rica, El Salvador, and Nicaragua. Like NAFIN in Mexico, this model is also an intriguing way to invigorate, redefine, and refocus a state-owned development bank. The NAFIN program has shown that in addition to financing, a development bank can also be utilized to provide training and information. Factoring is an ideal source of financing in countries with small, risky suppliers and large or foreign buyers. However, successful factoring programs require government support in setting up a legal and regulatory environment that allows for the secure and electronic sale of receivables.

3. TRADE FINANCE WITHIN THE SUPPLY CHAIN TO EXTEND CREDIT

Building on the previous section, this section will look at the ways in which the benefits of trade finance within the supply chain can be extended to benefit all the economic agents operating along the supply chain, and particularly agricultural producers and agribusinesses operating in rural areas. Buyers and sellers linking finance to other activities in the supply chain has been a standard method of doing business in both developed and developing countries since trade began. Despite its entrenched nature and the ease with which some large exporters and large traders can access working capital through trade finance, some participants in the supply chain are often unable to use this type of working capital; this is true for smaller exporters and traders, and in particular for small processors, producers, and local traders who operate in developing countries.

FINANCING THE SUPPLY CHAIN

Trade finance is the provision of any form of financing that enables a trading activity to take place. This finance could be provided by a buyer to a seller in order to enable the seller to finance his production. Often this finance is allocated to allow access to better inputs that would not be accessed otherwise due to unavailability of credit, transportation, storage, or other costs. The buyer has the incentive to provide this type of finance to ensure the quantity and quality of the specific goods needed for his business. In addition, in order to increase sales volumes, sellers of inputs or other services also have incentives to extend credit to increase their sales volume (Nkini 2005).

In well developed markets that are characterized by transparency, sophisticated risk hedging instruments, pricing of risk, and a variety of effective collaterals, buyers and sellers often use the credit terms of trade finance to differentiate commercial counterparts and negotiate the terms of the transaction. Conversely, producers and agribusinesses that form the base of the productive chain in developing countries often have difficulty even entering into financing arrangements within the supply chain, let alone negotiating terms. Credit constraints for agricultural producers and agroprocessors within emerging markets create problems for purchasing inputs, hiring labor for production, storage, processing transportation, and accessing markets. Both open account financing and advanced payment financing provide some solutions to these constraints.

One can generalize trade finance into two different categories. The first category is open account financing where the seller provides goods in advance of payment such as an input provider giving fertilizers in March with the expectation that he will be paid in September when the crop is harvested. The second type of financing is advanced payment financing where the buyer provides some payment for the goods trusting that the seller will ship the specified goods at a later date (Nkini 2005).

Through open account arrangements with input providers, producers are able to access fertilizers, pesticides, and more in exchange for payment at sale, or in some cases in exchange for delivering to the input providers. In some commodities this same type of open account arrangement can be made with processors who agree to mill or process the commodity in exchange for payment at a later date. While open account financing allows producers to access the necessary goods and services for their production and allows service providers and input providers to have a market for their goods, this type of

arrangement creates default risk particularly for the seller. Default on payment by the buyer could be caused by a number of different factors, including yield shortfalls due to weather and pests, price declines that impact the value of the goods, illness in the family, or a variety of other causes. By providing goods or services on credit the supplier begins taking on the same risks as a formal financial institution, often without undertaking the same types of due diligence or using risk mitigating instruments that banks require.

Advanced payment arrangements also provide a means by which producers can secure inputs and provide farmers with the liquidity to facilitate their production and trade. This type of advance payment allows the producer to hire labor, procure inputs, and pay for transportation and storage of goods. Advance payment facilities could be extended by exporters, processors, or traders. Advanced payment arrangements provide producers the capital necessary to run their business while allowing buyers to guarantee supply. This type of arrangement creates its own set of risks for the buyer, including default by the seller on delivery of the physical product (seller), late delivery by the seller, or failure to meet the contract stipulations agreed upon.

Financing both through open account and advance payment arrangement can be facilitated with or without the intermediation of a bank. In those cases where the bank is the intermediary, this type of financing requires that the bank takes on default risks by ensuring that the buyer and the seller meet their obligations and paying the costs if they do not.

While this type of finance should not be labeled “innovative,” expanding its use to small actors will require innovation. Private traders, exporters, and importers have been looking for these types of market opportunities in almost every agricultural sector, and in many cases have already been successful in extending financing through these means. This section of the paper looks at what type of innovation is required to push this type of financing further into the agricultural sector.

EXTENDING FINANCIAL SERVICES THROUGH FINANCING THE SUPPLY CHAIN

In contrast to failures rooted in concessionary directed credit, linking credit delivery to other products and services along the supply chain through trade finance can reduce the adverse impact of asymmetric information; decrease the high transaction cost of both creditors and the borrowers; and ensure better and more intensive, high quality inputs use within a more rational, comprehensive, production, marketing, and finance framework. In addition, the enhanced transparency obtained with respect to commodity prices has the potential to improve farmers’ bargaining position with traders in determining sale price. Such linkages could discourage moral hazard and adverse selection behaviors by farmers that are prevalent in stand-alone agricultural finance. Because of the integration within the supply chain, lack of credit or insufficient capital anywhere within the chain has an impact on the other participants, as demonstrated in Table 3.1.

Table 3.1. How limits on credit impact the supply chain

<i>1. Lack of credit for the:</i>	<i>2. Impacts the:</i>			
	<i>Exporter</i>	<i>Processor</i>	<i>Producer</i>	<i>Input Provider</i>
<i>Exporter</i>	<ul style="list-style-type: none"> • Can't purchase sufficient volume to meet contracts. • Can't attain scale within business and loses money. • Can't negotiate on price adequately due to inability to guarantee quality, quantity, and timely delivery. 	<ul style="list-style-type: none"> • No bankable demand for services. 	<ul style="list-style-type: none"> • No market. 	<ul style="list-style-type: none"> • Reduced bankable demand for inputs by producers.
<i>Processor</i>	<ul style="list-style-type: none"> • Difficulty in securing adequate, potential level and timely (constant) supply from producers. • Can't source quality because of lack of adequate inputs labor. • Out-turn rate is low, and inefficient utilization of machinery, equipment, etc. • High prices for processed products due to inefficient processing. 	<ul style="list-style-type: none"> • Difficulty running operations. • Can't secure sufficient volumes. • Can't hold stocks in order to operate most efficiently. 	<ul style="list-style-type: none"> • Can't provide value-added service. • Delays in milling and processing, resulting in storage costs and potential sales losses. 	<ul style="list-style-type: none"> • Producers can create high quality goods, so lack incentives to utilize inputs.

Table 3.1. How limits on credit impact the supply chain

<i>1. Lack of credit for the:</i>	<i>2. Impacts the:</i>			
	<i>Exporter</i>	<i>Processor</i>	<i>Producer</i>	<i>Input Provider</i>
<i>Producer</i>	<ul style="list-style-type: none"> • Difficulty in securing constant supply as above from producers. • Producers can't produce quality because of lack of inputs labor. • Reduced supply due to low risk, low yield production patterns. 	<ul style="list-style-type: none"> • Volume shortfalls resulting in running factory inefficiently. • Lack of economies of scale. • Difficult in obtaining standard grades. • High cost of capital per production unit. 	<ul style="list-style-type: none"> • Suboptimal production mix. • Limited use of pesticides, lowering yields and quality. • Asymmetric price information causes producers to be price takers at the farm gate. • Adopts low risk, low yield production pattern. 	<ul style="list-style-type: none"> • Reduced bankable demand for inputs by producers.
<i>Input Provider</i>	<ul style="list-style-type: none"> • Poor quality and reduced quantity of production by producers due to lack of adequate inputs. 	<ul style="list-style-type: none"> • Volume shortfalls resulting in factory utilization inefficiency. • Lack of economies of scale. • Difficult in obtaining standard grades. • Limited capacity to absorb fixed costs associated with processing. 	<ul style="list-style-type: none"> • Provide inputs expensively due to the high costs of inputs, uncertainty regarding sales volume, and high risk associated with selling on credit. • Difficulty maintaining stock. 	<ul style="list-style-type: none"> • Provide inputs expensively due to the high costs of inputs. • Difficulty maintaining adequate stock, uncertainty regarding quantity to be sold.

Source: Authors

Well functioning supply chains ensure that each link can adequately and efficiently access credit either 1) directly from a financial institution or 2) indirectly from another link of the supply chain when the latter benefits from lower cost of own capital or borrowed funds and an advantageous position with respect to information asymmetry and/or lower transaction costs. The borrowers' ability to generate cash flow to repay the loan is enhanced when linked to marketing services and input supply, providing a win-win linkage that enhances the profitability of the producers (and other stakeholders).

Economies of scope and scale

A well-organized supply chain has the potential to generate economies of scale (e.g., providing credit to farmers that otherwise wouldn't have accepted credit or increasing the credit amount provided to farmers that previously received credit) and economies of scope (e.g., increasing the quantity or quality of other products that borrowers used or wished to use, such as increasing the supply and use of improved seeds). This type of credit enhances the welfare of the various stakeholders, such as retailers, creditors, farmers, transporters, and exporters that take part in the supply chain.

Linking credit to the delivery of other "products" along the supply chain allows more effective absorption of the fixed cost of each transaction so that the sum of the transaction costs involved within the supply chain would be smaller than if each "product" was delivered separately. This, in turn, could result in increasing the volume and improving the quality of product provided, reducing input cost (per unit sale price), and substantially reducing credit risk. In addition, the delivery of credit through the supply chain reduces both the administrative cost for screening borrowers and loan collection and mitigates credit risk, particularly when structuring the product to be self-liquidated at the point and time of the sale of the product. Credit risk is also reduced because the production is geared to better address markets' demand for a product reflecting the knowledge and expertise of the large purchasers and exporters.

These advantages are highlighted in the three case studies that are associated with this topic paper describing how such linkages can reduce the overall costs and risk of the transactions made along the supply chain compared to carrying out such transactions separately. This, in turn, contributes significantly to creating a more efficient, secured, and augmented credit delivery.

Improved quality and production

The linkages facilitate higher certainty regarding the quantity and quality and timing of produce delivery. This, in turn, contributes to better negotiating and possibly guaranteed prices in domestic and export markets. Enhanced certainty with respect to produce delivery could augment prices that would filter down to the farmers and owners of the supply chain. Low income farmers that are particularly risk averse could benefit from enhanced certainty related to all aspects of production, credit availability, transportation, and marketing.

PREREQUISITES AND CHALLENGES

Supply chain financing has some particular prerequisites for providing financing in an agricultural sector.

Contractual enforcement or enforceable linkages

Lending within the supply chain requires that the parties can be guaranteed to meet their contractual obligations. Because supply chain lenders are not formal financial institutions, borrowers can often see these obligations as less enforceable or binding than those contracts made with other institutions, such as banks. If the borrower cannot be obligated to repay their loan or deliver their physical good, this type of financing is not possible. Without legal or social ramifications of default, risk increases and the trade financing is untenable. Hence the introduction of self-liquidating loans, whereby the value of the loan is

deducted at the sale time and point from the sale revenue, a major contribution to increasing the loan security of credit delivered by processors or suppliers. Low value commodities, such as cotton, that have a clear “constriction” point at delivery or processing, are most suited for self-liquidating loans that are repaid at delivery of the produce. Because these low value crops are usually bulky and the additional gains from transport to another buyer are minimal, there is less incentive to default than for high value products per pound, such as coffee. Such differences could impact the cost and the characteristics of the supply chains, the embedded credit risk, and the volume of credit that is delivered to different actors.

Ensuring trust among participants

Where legal contract enforcement is weak, introducing trust among the stakeholders of the supply chain can still improve the functioning of the chain. Well-functioning supply chains, where each link in the chain improves its profitability compared to conducting separate, unlinked transactions, generate trust in handling future transactions. Trust is essential for delivery of credit that, unlike other transactions, exchanges only a promise to pay the loan for cash granted (or in kind inputs). The Cotton Clark case study highlights that the success of the model partially relies on the relationship and the trust that has been built between cotton producers and Cotton Clark. While Cotton Clark also benefits from limited competition, farmers know that by selling to Cotton Clark they can benefit from the TA and inputs that it provides. The impact of absence of trust in credit markets is compounded when effective collateral hardly exists - a typical situation with respect to low value denominated agricultural loans. Enhanced trust can further contribute to the establishing of or strengthening of already existing rural institutions, farmers’ cooperatives, and the like that eventually could improve the bargaining position of low income farmers with other participants in the supply chain.

Managerial capacity

Providing financing within the supply chain is neither cost free nor risk free. This requires generally higher quality managerial skills, testing, and a wide range of coordination among all vested interests involved.

Creating incentives

Producers and businesses in the supply chain are motivated by profit, and this needs to be kept in mind in the establishment of supply chain financing. In order for these types of financing arrangements to be effective, the cost of default needs to be greater than the potential benefits. In this case, the costs of default should be considered to be not only losses in revenue, but, when applicable, have social and legal implications as well.

The role of local banks

For supply chain financing to function optimally, local banks must be willing to extend credit to the improved supply chain. Banks have an incentive to do this because the organization of the supply chain often allows substantial saving on transaction costs, as well as improving the creditworthiness of its borrowers. Instead of delivery of a large number of very small loans to farmers, the supply chain can be used to ensure that other economically stronger links in the chain (e.g., exporters) become a more efficient de facto financial intermediary. These intermediaries, when delivering credit received from local banks to retailers, processors, and farmers, can consequently reduce much of the transaction cost associated with credit delivery by absorbing these costs through the other links of the supply chain who “package” credit with other transactions (e.g., supply of seeds and transportation).

CASE STUDY: USING FARMER OWNERSHIP TO IMPROVE THE SUPPLY CHAIN - SUGDAGROSERV, TAJIKISTAN

Cost Reduction:	<ul style="list-style-type: none">• Coordination within the supply chain• Aggregates financing, technical advice, processing, and marketing
Risk Reduction:	<ul style="list-style-type: none">• Technical assistance leads to improved yield and quality• Offers access to premium markets
Culture of Innovation:	<ul style="list-style-type: none">• Farmer ownership creates strong incentives for growers

In Tajikistan, cotton production represents two-thirds of Tajikistan's total agricultural output and approximately 12 percent of its total exports. The cotton sector accounts for 28.1 percent of GDP and employs 64 percent of the workforce. But the sector faces a number of problems and has not yet recovered its yields to the production levels in 1990 of 2.8 kilogram of seed cotton per hectare. The sector suffers from high production costs and low productivity due to several constraints:

- a) Inadequate crop and input financing (reliance on in-kind input financing through brokers)
- b) Use of overpriced and low-quality inputs by farmers, which are delivered late
- c) Low technical capacity
- d) A nonfunctioning risk management system
- e) Legal and regulatory barriers and unfavorable local government interference.

In this context, the IFC, in conjunction with the farmers of the Khojand region, formed SugdAgroServ to provide services and financing for cotton farmers.

Innovation

SugdAgroServ (SAS) is a closed joint-stock company established under the IFC–Swiss Secretariat for Economic Affairs (SECO) Farm Ownership Model (FOM) project in 2002. The FOM project aims to reduce rural poverty in Tajikistan by providing comprehensive services to farmers through SAS on a strictly commercial basis. SAS has chosen a distinctive legal structure in which member farmers are the company's shareholders. By giving producers a stake and ownership interest in the company, SAS is better able to address the need of local producers in the Khojand region. Donors, farmers, agrosupply vendors, and traders are major participants in the SAS program designed to improve the efficiency of cotton production through the vertical integration of the supply chain. The program has three main components:

Working capital and investment loans to shareholder farmers and other clients.

SAS loans are short- and medium-term loans, depending on the cultivation cycle of its clients. Maximum maturities of SAS loans range between 18 months for working capital loans and 3 years for investment loans. The loans are disbursed with different repayment schedules to better reflect the cash flow needs

and revenue stream of SAS clients. Interest rates are set at competitive levels compared to rates charged by banks in Tajikistan.

Marketing services.

SAS markets on behalf of their clients in order to secure advantageous prices in relation to other local traders and buyers. In addition to establishing sales contracts with international traders who have domestic operations, SAS is in a better position to contact traders in Moscow and Kazakhstan to achieve better prices.

Sourcing and sale of inputs.

SAS procures and sells high-quality inputs to farmers at reasonable prices. It concentrates on three main inputs, fertilizers, chemicals, and petrol and diesel fuel, and, to a lesser extent, on seeds that are primarily procured in neighboring Uzbekistan. In addition to providing inputs for its owner farmers, SAS is in the process of opening a retail store to sell agriculture inputs to all farmers.

In addition to credit, marketing, and input services, SAS complements and enhances the effectiveness of its three main activities through a TA program that aims to fill in any knowledge gaps in the production of high-quality cotton cultivation for farmers. While SAS still relies on IFC staff in order to promote sustainability, a primary aim of the TA is to build capacity of local staff in order to transfer managerial responsibilities.

Performance

SAS has generated a 15 percent return on equity, a 9.6 percent average interest rate income, and 7.4 percent returns on operating assets, while maintaining average funding costs at only 4.7 percent. SAS has become an important, comprehensive service provider in the cotton sector in Khojand. It extended 115 loans to 110 clients, with a total outstanding portfolio of US\$0.8 million. To date, all loans are performing. SAS marketed approximately 1,516 tons of raw cotton for its clients, generating more than 21 percent of the company's revenues. Despite taking off slowly, SAS's retail operations are growing. Retail transactions have contributed more than 46 percent to the company's income.

SAS is having an impact on its client's revenues. Evidence shows that yields and profitability of SAS clients consistently outperformed nonclients. The two key features are loan policies that provide timely financing throughout the supply chain and the retailing service that disentangles farmers from traditional in-kind input financing. As part of the overall implementation plan of the IFC project, SAS is undergoing an expansion that will allow it to increase its capital and shareholder base and transfer the management of the company to qualified local staff in the near future.

Despite its success, the involvement of donors in the development, capitalization, and management of SAS has been significant and has implications for the replicability of this model. The initial capital investment of the farmer and owners in the creation of SAS was only US\$1,472, which was provided by 365 farmers and owners with help from SECO. The remaining funds for initial capitalization were provided by SECO in addition to the support of a 10 year long-term loan from the IFC. Also, in March 2004, SECO and the IFC approved an expansion program that will include a US\$0.5 million capital injection by SECO in grants, and an additional US\$0.5 million long-term loan from the IFC. In addition, SAS has two full-time IFC staff as members of its management team.

Risk and Cost Reduction

The integrative nature of SAS activities reduces both costs and risks in its operations. On average, SAS offers credit to clients at 2 - 4 percent lower rates than the local banking sector. This important role of

initial capitalization by donors and continued donor involvement in the financing and management of the company does, however, raise questions regarding replicability of the SAS model in the absence of donor support. On the risk management side, the SAS ownership structure contributes to better portfolio management. Because borrowers are also SAS shareholders, staff can supervise clients more frequently, for example, during seminars and workshops organized under the TA program in addition to regular on-site visits, thereby reducing default risk.

Some challenges remain for SAS in order to improve future operations. As SAS's portfolio and client base expand, there will be a need for a more systematic approach to price risk management. Among other possibilities, SAS could play an important role in intermediating futures contracts for its clients, thus transferring the price risk element of SAS's portfolio to international financial markets. SAS also needs to scale up its marketing operation as evidence suggests that current demand for the service exceeds supply.

Sustainability and Replicability

There are questions about the replicability of the SAS model in its entirety. As mentioned previously, the substantial financial resources invested by both SECO and the IFC, coupled with the placement of IFC staff in management positions, bring the endemic replicability of this model into question. The IFC is currently undertaking a full evaluation of the financial performance of SAS, which should provide more information on the long run sustainability of this initiative.

CASE STUDY: INTEGRATING CREDIT AND MARKETING FOR HORTICULTURE - THE DRUMNET MODEL IN KENYA

Cost Reduction:	<ul style="list-style-type: none"> • Coordination within the supply chain • Aggregates' financing, technical advice, processing, and marketing
Risk Reduction:	<ul style="list-style-type: none"> • Technical assistance leads to improved yield and quality • Offers access to premium markets
Culture of Innovation:	<ul style="list-style-type: none"> • Development of relationship with growers through presence in growing areas and TA

More than 90 percent of smallholder farmers in all but the arid regions of Kenya produce horticultural products. Despite high levels of production, 90 percent of horticulture is consumed domestically and less than 2 percent of smallholder farmers produce for export. The share of smallholder participation in exports has fallen from around 75 percent in the early 1990s to current levels of less than 50 percent. The minimal levels of horticulture exports and the declining export share by smallholder farmers reflect limited access to credit due to:

- High transaction costs and default rates for banks and microfinance organizations
- Mixed results of exporter's out-grower credit schemes
- Unreliability of SHGs and co-ops as credit providers
- Reduced efficiency of agrovendors when required to sell on credit.

This limited availability of credit, coupled with a shortage of information about exports' markets, are major hurdles for accessing export markets for horticultural products. The recent imposition of the European Good Agriculture Practices (EUROPGAP) requirements on food safety only poses additional quality challenges to Kenya's horticultural producers.

Innovation

DrumNet is an emerging network of rural area farm business support centers delivering agricultural extension, credit, and marketing services to smallholder horticultural farmers. The main objective of DrumNet is to simultaneously address credit and market limitations by integrating both services in order to increase farm productivity and the efficiency in the overall business chain. DrumNet also encourages production of high value-added export-oriented crops while ensuring that farmers meet the safety standards necessary for export. Farmers, banks, inputs providers, and exporters are key participants in DrumNet's program, which has two main components:

Cashless micro-credit program that links commercial banks, smallholder farmers, and retail providers of farm inputs

Farmers participate by opening a personal savings account with a local commercial bank and making the first cash contribution to the Transaction Insurance Fund (TIF), which serves as collateral for the initial line of credit. By contributing to the TIF, DrumNet members organized into coguaranteed solidarity groups that can utilize their DrumNet transaction card to purchase inputs on credit with participating local suppliers. The suppliers, trained in basic DrumNet record keeping, submit receipts to DrumNet and are paid in 2-week cycles from a DrumNet credit account. Because DrumNet also markets the product, DrumNet deducts principal and interest payments from farmer net returns at harvest time and tracks credit history. It also enforces group guarantees, if required.

Market services through an integrated marketing and payment system with large-scale buyers, farmers, transporters, and field agents.

DrumNet negotiates export contracts on behalf of DrumNet producers that typically pay 10 – 15 percent higher than the prices offered by local traders, and provides centralized collection points. Once the produce is delivered to the exporter at collection points, the exporter pays DrumNet, which in turn will deduct any loan repayment, prespecified TIF percentage, and credits the rest to the individual bank account of the farmer.

Central to the smooth functioning of the DrumNet system is the application of technologies such as mobile phones and short message service (SMS), computers, and smart cards to maintain effective communication among all participants.

Performance

DrumNet has had success in marketing high-value, export-quality horticultural products and seeks to expand its operations to two additional regions. Since commencement in October 2003, DrumNet has facilitated more than 7,700 marketing transactions on behalf of the now currently active 647 members and has generated more than Ksh 2.9 million (US\$38,658). In total, this represents more than 75 metric tons of produce moved between smallholder farms and advantageous markets.⁷ During the past year, DrumNet has provided credit in the form of reimbursement to input providers for 485 individual farmers (Ksh 1.3 million or US\$16,250).⁸ Repayment rates have been high and member contributions to the TIF accounts high (more than Ksh 400,000) thanks to the model's ability to collect repayments directly from the net proceeds of marketing transactions. In terms of impact, evidence from a randomized control evaluation

has shown that farmers strongly prefer DrumNet's linking of credit to marketing services over the provision of standalone market services.

DrumNet also brings about an indirect but important benefit through the transfer of information to farmers. DrumNet staff distribute accurate pricing data and other materials, address concerns of farmers, and encourage the participation of farmers in their programs through their local offices and mobile phones communication.

Risk and Cost Reduction

DrumNet's success results from its innovative program design that substantially reduces the risk involved in horticultural finance. By providing credit to farmers in the context of negotiated contracts for specific crops with large-scale buyers, participating banks are able to minimize loan defaults due to poor crop selection or inability of the farmer to market products. This integrated system also gives the lender first access to profits from the sale of production before the borrower in order to pay down any outstanding loan balance. DrumNet provides training courses on quality and safety of produce and ensures through its cashless line of credit with selected input providers that farmers only use inputs certified by EUROPGAP, thus enhancing the marketability of their products. The risk to banks is further reduced as participating farmers begin saving and building cash reserves with a reliable institution while building a credit history.

Despite the success of the approach, challenges remain for DrumNet. DrumNet has not yet covered its costs. By mid 2005, DrumNet's original office plans on serving more than 1,000 farmers, at which point the office will be covering its local costs.⁹ To be profitable and sustainable in the long term, DrumNet must achieve economies of scale with regard to number of farmers, produce, and loans. Lessons from early operations also suggest that DrumNet must put more effort into establishing a close relationship with farmers through transactions agents. This ensures that produce is sold to DrumNet, thus preventing loss of revenues for both DrumNet and farmers. Moreover, enough credit must be extended to farmers to ensure year-round production. This will prevent a halt in planting and harvesting while reducing the need for farmers to seek alternative loans from market actors who stand to benefit from lending to trained farmers without contributing to DrumNet's investment.

Sustainability and Replicability

Despite its revenues, DrumNet is not yet breaking even. In Kerugoya, DrumNet is carrying out its activities with financial assistance from the Canadian International Development Research Centre (IDRC). By mid 2005, this single office in Kerugoya plans on serving more than 1,000 farmers, at which point the office will be covering its local costs. DrumNet is currently projecting that a start-up investment of US\$75,000 will support a single field office's start-up and operating expenses for the first two years, at which point the office will be producing a volume of business sufficient to generate profit. As the case develops, a better evaluation can be made of its financial sustainability in the long term.

CASE STUDY: SUPPLY CHAIN FINANCING - CLARK COTTON, ZAMBIA

Cost Reduction:

- By offering inputs, creates one-stop shop for financing, technical advice, processing, and marketing

Cotton is an important cash crop in Zambia, second in production volumes only to maize and tobacco. The contribution of cotton to Zambia's GDP is approximately 2 - 4% and there are 130,000–150,000 households engaged in production (Tschirley and others 2004). In some agricultural sectors in Zambia, such as maize, tobacco, soya, and wheat, commercialization of farming is increasing, partly as a result of

cross-border learning, as well as migration from South Africa and Zimbabwe. In these sectors, large scale farmers build balance sheets and access credit based on the assets of the farm and use capital expenditures to improve production. This does not happen in the cotton sector, where production remains small scale, involving growers who do not have access to credit from the formal financial sector.

Cotton in Zambia is structured around the operations of two very strong commercial intermediaries, Dunavant and Clark Cotton, which perform all of the important integrated services of traders in the physical chain: transportation, handling and storage, processing, sales and marketing. Both companies also provide high-quality inputs to farmers on credit. Both companies have a commitment to cotton growers in Zambia and see producers as critical to success of the business. Cotton growers who supply physical cotton to Dunavant and Clark receive high quality inputs on credit and enjoy the benefits of the integrated model.

Innovation

Integrating finance of inputs into supply chain activities is not new in the developed world, but is rare in the developing world because of the lack of strong commercial intermediaries with a focus on the physical trade and optimizing financing, production, quality, logistics, storage, processing, and risk management functions in between. Successful commercial intermediaries with integrated supply chain management recognize that a profit-making opportunity exists in continuously working to lower cost, increase efficiency, and optimize these value-added activities together in the middle of the chain.

Cotton Clark finances growers through a structured loan package that provides inputs on credit. The growers participating in the scheme have no assets and cannot use land as collateral because it is communal and held in a trust by a chief. There are two main requirements for participation in the scheme: a grower must have a ½ hectare of land as a minimum and be 18 years of age. The input loan package includes:

- Planting seed, which is disbursed at the beginning of the season
- Insecticide, which is disbursed after verification by field staff that the seed has been planted
- Fertilizer, which is provided at same time as insecticide
- Plastic knapsack sprayer for application of the pesticide for farmers with 1 hectare, or those organized into small groups.

The total value of the package without sprayer is approximately 250,000 Zk per hectare, or US\$.088 per kilogram.¹⁰ With a sprayer, the package value is 520,000 Zk per hectare, or US\$.18 per kilogram. The inputs are high-quality, standardized products that would not be available to the farmer without such a program. The input package also includes provision of wool bags for storing the cotton. After harvest, physical farmers move the cotton by hired oxcart to various buying points (there are 1,440 of them in the cotton growing areas) and the farmers receive payments at that time. The final payment received by the farmers at time of delivery subtracts the costs of the input package received. In prior years, the input loan included cash to pay for labor, but that practice was disbanded because the cash was frequently used for nonproductive purposes.

In this arrangement there is a contract between the grower and Cotton Clark, but because contracts are not generally well respected or enforceable, the system relies on trust and strong commercial incentives on both sides to honor the business relationship. Participating growers receive an identity card that establishes an account number and the transaction is carefully tracked through a complex, paper-based monitoring system at the company's main office in Chipata.

In order to make sure that the inputs are used most effectively and ensure that Cotton Clark receives the quality of production expected by the investment, Cotton Clark makes training an essential component of

this program. Growers are provided with training at the beginning of the season, and supported throughout the season by a strong network of Clark field staff that includes 120 permanent workers and others performing functions in the field and at buying stations. Training covers issues such as proper application of pesticide in addition to care and maintenance of sprayers.

Performance

One of the best indicators of the success of this program is the strength of the relationship that has developed between Cotton Clark and its growers. The company organizes performance-based incentive programs, growers are loyal to the company, and there are strong indications of a sense of mutual cooperation between the company and its suppliers.

Cotton Clark started operating in 1996 after divestment of the parastatal Lint Company of Zambia. At that time, annual sales volumes were 8,000 - 14,000 metric tons, but they have now risen to 42,000 metric tons. Yields have increased from 600 kilograms per hectare to an average of 1,200 kilograms per hectare, sometimes reaching 2,400 kilograms per hectare. The target for repayment of loans is 87.5 percent, but actual rates have been 94 percent in 2000, 95.35 percent in 2001, 95.5 percent in 2002, and 97.02 percent in 2003. In 2003, Clark provided inputs for 62,334 farmers, of which one was 354 kilometers away from the gin.

Sustainability and Replicability

The key to the successful growth and sustainability of this program over the years has been a strong relationship between growers and the company. Building a program based on mutually beneficial commercial incentives has helped to build trust. Other keys to success for Clark Cotton are:

- Investing in careful identification of the borrowers
- Creating a system that monitors financial accounts for each of the 623,000 growers
- Strict controls on the quality and variety of seed
- Education on the whys and hows of proper pesticide application.

There are two main challenges to the sustainability of the program. First, in 1999 - 2000, similar programs throughout Zambia ran into trouble when world market prices were falling. Ginner interviews indicate that loan repayment rate dropped from 86 percent in 1996 to 65 percent in 1999 and 2000 (Tschirley and others 2004). Because the input schemes do not involve any mechanism for shielding price risk from the producer, they will be tested during periods when world market prices are low. The second main challenge to the program is a typical free rider issue that results when short-term opportunistic traders enter the market. When these free agents buy cotton independently without being involved in the other activities of the supply chain (i.e., input provision, logistics, and ginning), it undermines the sustainability of Clark's model. If Clark cannot obtain sufficient volumes of physical cotton for the investment in inputs, the company runs the risk of incurring significant losses. Currently, the tension between wanting to encourage competition while at the same time protecting the existing input credit programs from pirate buyers is a major challenge for the sector.

The business model used by Clark is replicable for other successful physical traders and processors who see a value in downward integration that allows them to optimize a wider range of commercial intermediary functions. Financing, when it can be done with minimal risk, is an important enhancement to more traditional trading and manufacturing roles. There is rarely a one-sized fits all model for this kind of integration in the supply chain, but processors are in a position to tailor solutions to fit the unique characteristics of the market in which they are operating.

4. RISK MANAGEMENT

Producers and agribusinesses are constantly dealing with risk. This risk comes from a variety of sources, but two of the most unpredictable and uncontrollable sources of risk are price and weather. A number of unsuccessful attempts have been made to deal with this risk by both governments and the private sector. For example, crop insurance, price stabilization schemes of different kinds, and loan forgiveness have been used to deal with the risk of nonrepayment due to systemic risk factors. However, in the postliberalization era and after suffering large losses from price stabilization efforts on agricultural lending activities, many governments have largely abandoned these efforts and are seeking more efficient alternatives.

Just as producers and agribusinesses deal and work in an environment with this type of uncertainty, their financiers do also. Managing this risk would not only bring greater certainty to their business by allowing them to optimize production patterns, invest more in their farm, and consider higher value crops, but it also has significant implications for their risk profile, and in turn, their ability to access credit. By managing this risk, agribusinesses and producers could have greater access to credit both through the traditional banking sectors and other lenders. Greater integration of risk management in the activities of banks and borrowers is likely to result in improved access to credit for small-scale producers and a healthier loan portfolio for creditors.

Although informal approaches to mitigate and cope with agricultural risks have existed for a very long time, increasingly there is the realization that some of these traditional approaches may reduce mean income (Dercon 2002). The literature has argued under certain circumstances, market-based arrangements could improve the ways that rural people mitigate and cope with their risks and thereby improve creditworthiness and access to finance. In some cases, these market-based approaches can complement (rather than substitute) existing informal arrangements in order to strengthen their solvency (Skees and others 2002).

This section will focus on three different risk management techniques and attempt to highlight when and where these instruments are applicable, how they can reduce risk, and what are the necessary preconditions for their use. First, we will discuss briefly risk-sharing strategies before highlighting risk management methodologies that transfer price and weather risk to international markets.

RISK MANAGEMENT TOOLS

Farmers have several risk management tools at their disposal. Risk reduction strategies involve farm management techniques, including selection of products with low risk exposure (drought resistant) and short production cycles. Self-insuring through holding liquidity and diversification of products or income sources (including off-farm) are other ways to reduce risk ex ante. Risk sharing-strategies include marketing and production (contract farming) contracts, vertical integration, hedging on price risk markets, and participation in risk mutualization schemes and insurance.

Different types of risks require different approaches. Agricultural risks can be systemic risks that affect a large number of people at the same time. Severe droughts, floods, and collapses in commodity prices are the most prominent examples. Individual or idiosyncratic risks affect one farmer at a time; they are not correlated across space. In between these two types of risk there are risks that tend to be localized in few

areas and affect a relatively small number of farmers. As a result risks require various instruments depending on the type, severity, and frequency of the risk.

Risk Pooling

Pooling resources among individuals or communities in order to deal with shocks at the local level is a cost efficient way to deal with risk. By saving during good times in order to have resources during shocks, groups at the local, regional, and national levels are able to protect themselves against risk without incurring the costs of transferring that risk to another party. Risk pooling can be an effective mechanism to finance non-catastrophic events. Through the Law of Large Numbers, the average value of (almost) independent risks tends to its expected value as the number of individuals increase. The build up of collective reserves allows the self-insurance fund to absorb deviations of average losses for expected losses.¹¹

While risk pooling at the different levels can be effective in managing low levels of covariate shocks and idiosyncratic risk, it is not well suited to high levels of covariant risks, such as weather events or price movements. In these cases, because all the individuals within an area would be drawing on resources at the same time, the pool would be depleted and could fail to meet expected payouts. In order for this type of program to be effective it would need to be complemented by a mechanism to transfer the non-diversifiable, catastrophic risks in order to optimize the capacity of self-retention. This would require agreements to define the risk-sharing agreements between the risk-pool mechanism and risk-transfer mechanism.

Price Risk

Market-based, price risk management has the potential to help farmers or commercial intermediaries manage the risk of adverse price movements on commodities markets through the use of either physical or financial instruments.¹² Because the financial impact of price volatility could easily deplete risk pools and has proven to be too large for government or any other actor to simply absorb, producers or commercial actors who are negatively impacted by price volatility must turn to the market and find mechanisms to transfer the risk to market actors who are better equipped or more willing to manage it. Commodity market instruments exist so that market actors unwilling to carry price risk can transfer it to actors willing to carry or manage the risk based on expectations of the opportunity to make a profit by doing so.

Such activity takes place either on a physical basis, through commercial trade of the actual commodity itself, or on a financial basis through instruments specifically developed for the purpose of risk transfer. Physical price risk management involves contractual negotiations between buyer and seller regarding the terms under which the exchange of the physical good will take place. Physical instruments for risk management involve strategic pricing and timing of physical purchases and sales (such as “back-to-back” trading), forward contracts, minimum price forward contracts, price-to-be fixed contracts, and long-term contracts with fixed or floating prices.

Financial instruments are exchange-traded futures and options, over-the-counter (OTC) options and swaps, commodity-linked bonds, and other commodity derivatives. Generally, the financial instruments are only developed in commodity markets with established exchanges. The primary functions of commodity exchanges are to serve as clearinghouses for the transfer of risk from one commercial participant to the other and to provide a transparent price discovery mechanism.

This transfer of risk can be done through futures contracts, which are similar to forward contracts in that they are agreements to buy or sell a specific quantity of a commodity, at a specific price, on a specific date in the future. Unlike forward contracts, however, futures contracts do not necessarily imply physical delivery to fulfill the contract. For commercial intermediaries in developing countries, futures contracts

have an advantage in that they can “lock in” a sales price in advance of the actual delivery of the product. In essence, if the commercial intermediary is losing on the physical sale, he should be gaining on the financial and if he is losing on the financial, he should be gaining on the physical. The major disadvantage for use in developing countries, however, is the credit risk inherent in trade of these contracts.

A second type of contract traded on international exchanges, an options contract, can also be used to manage risk. Option contracts are similar to physical minimum price forward contracts in that they are agreements to buy or sell a specific quantity of a commodity, at a specific price, on a specific date in the future, but they also provide an opportunity to take advantage of favorable price movements in the future. Unlike minimum price forward contracts, however, options contracts do not necessarily imply physical delivery to fulfill the contract. The instrument is valuable because it avoids absolutely “locking in” a price level as happens with a futures contract, and it provides the user with an opportunity to take advantage of favorable price movements that may occur between the time of purchasing the instrument and the time of its expiration. Because premiums are paid up front, there is credit risk. Table 4.1 evaluates the potential for using price risk instruments.

Table 4.1: Evaluating the Potential for Using Price Risk Instruments

Is the commodity traded on an established exchange that offers financial risk management (futures/options)?			
Yes		No	
Does producer have enough capital or assets to obtain credit line to trade futures?		Is forward contracting common in the physical trading chain?	
Yes	No	Yes	No
Futures, swaps	Options	Forward contracts Minimum price forward contracts Price-to-be-fixed contracts Long-term fixed or floating contracts	Back-to-back trading Establish conditions needed for forward contracting

Source: Authors

Weather Risk

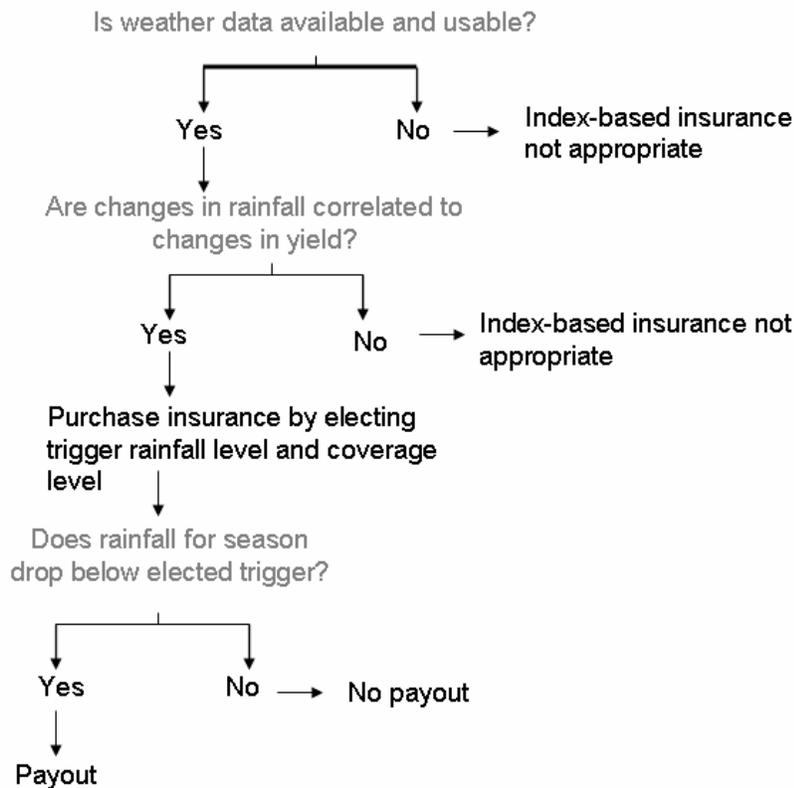
Few insurance mechanisms deal with weather risk. Traditional, multiperil crop insurance has not proven effective, particularly in the case of smallholders, and often excludes weather factors such as drought. Traditional crop insurance, common in developed countries, is typically heavily subsidized and is more appropriate for large, commercial farmers. These traditional programs rely on examination of individual farms and yield assessments. Traditional crop insurance relies on on-site farm visits to evaluate proper crop management and crop damage in case of claim, which substantially drives up costs in addition to raising issues of moral hazard and adverse selection.

Unlike traditional crop insurance that attempts to measure actual losses, index-based weather insurance utilizes weather measurements as a proxy for loss. By looking at a measurable risk that is correlated to yield rather than the yield itself, the impact of a weather event on a given region can be measured more objectively. In addition, index-based weather insurance can be more easily reinsured than traditional crop insurance, as international risk takers need to trust the data rather than the particular insurer and its underwriting practices. An index can be designed by analyzing how the weather variables determine yields over time, discussing key weather factors with experts such as agrometeorologists and farmers, or referring to crop models that use weather variables as inputs for yield estimates. If a sufficient degree of correlation is established between the weather index and yield, an agricultural producer can insure his production risk by purchasing a contract that pays out in case the specified weather event occurs. Figure 4.1 gives a brief overview of how index based weather insurance works.

Figure 4.1: How Index Based Weather Insurance Works

How Index-Based Weather Insurance Works

Example: Rainfall – A Correlated Risk



Source: Rebuilt from Hane Dennison.

EXTENDING AGRICULTURAL FINANCING

Risk pooling, market-based, price-risk management, and indexed-based weather insurance all provide unique advantages for the farmer, though each comes at a cost. Risk management brings greater certainty to the outcome of productive activities, improving creditworthiness of agricultural producers. In this way, traditional collateral becomes less paramount as production decreases in risk and increases in utility.

Risk pooling reduces the delivery costs associated with insurance or other market-based risk management activities. This type of risk pooling and sharing, along with self-insurance, is the most cost effective way to manage non-systemic risk. Risk pooling cannot smooth revenue from season to season, but it can help smooth income, thereby increasing creditworthiness. Because the participants in the scheme are operating in the same area, the delivery costs and operating costs can be reduced. In addition, moral hazard and adverse selection can be mitigated by peer monitoring and group responsibility. When things are managed at the local levels, communities can discern cases of moral hazard and do not suffer from high degrees of asymmetry of information.

The benefits of price and weather insurance differ from risk pooling. Instead of sharing the risk across a group or a community, these instruments allow this risk to be transferred from the participating parties to markets that are often looking for new risk. While the costs associated with the borrowers operations might rise due to premium payments, this risk transfer allows both borrowers and banks to protect themselves from price falls on the global market or weather shocks that could result in catastrophic falls in revenue. From a lending perspective, the use of price and weather risk management instruments can potentially help banks extend lending in the sector and reduce the cost because hedged or insured customers are more creditworthy than unhedged or uninsured customers. Because local banks have to compete to find clients, expanding the range of services that can be offered is an advantage for market competitiveness as well.

PREREQUISITES AND CHALLENGES FOR USE OF THESE INSTRUMENTS

The design of appropriate institutional, regulatory, and operational frameworks is the key prerequisite to implementing a successful pooling mechanism. The basis for the success of these schemes is achieving a real financial efficiency alternative for participants of the pooling mechanism, while ensuring the solvency of the initiative. Otherwise the alignment of incentives of the group is not achieved and frequently results in a common action problem. In brief words, the expected benefit of participating in the pool has to be transparent and exceed the potential benefit of acting outside of the pool.

The use of price risk management instruments has some very specific prerequisites that limit the applicability of these instruments in a number of sectors. While providers of these instruments, such as banks and brokerage houses, have an interest in expanding their business to emerging markets, financial price risk management instruments are only available for commodities traded on organized exchanges. As a result, in many cases for commodities whose productions are continuing to grow in developing countries, such as flowers, cashew, and tea, there are no markets or markets with insufficient liquidity to handle price risk. Even for those commodities that do have organized exchanges and sufficient liquidity there are limitations and prerequisites for managing risk through derivatives. One prerequisite is the existence of a well-organized and sufficiently large organization to intermediate these contracts with an international provider. Capacity to understand and operate the instruments is another limitation. Finally, there is often a credit gap that restricts a developing country's ability to access the lower cost tools such as futures and swaps (not options). Hedging with futures creates significant credit exposure on the part of the provider because the user of a futures contract is responsible on a daily basis for the financial exposure of his position, as created by movements in the market price. Thus, it is difficult to access the market for futures without large credit lines or the significant cashflow that are required to meet daily margin calls.

On the weather risk side, accurate historical and settlement weather data are the primary prerequisites for the use of these instruments. Index-based weather insurance pricing relies on quality historical weather data that are continuous records with at least 30 years of historical daily data and, ideally, few missing data points. In addition, many countries do not have a sufficient density of weather stations to provide

accurate information for all areas and types of crops. Daily weather data updates also are essential for live weather contracts, as well as a timely source of cleaned and quality-controlled settlement data.

Because both financial price risk management instruments and weather risk management instruments rely on established indices to trigger the outcome of the contract, there will inevitably be a mismatch between the very specific price or weather event experienced by an individual producer and the risk management outcome of the instrument. In both cases, this limitation is described as basis risk. In the case of price risk management, basis risk is the difference between the global price on the international exchange and the local price of the product. The difference between the two prices consists of transport costs, quality differentials, and supply and demand conditions in the two distinct markets. Because the correlation between the two market prices is rarely 1:1, the global price hedge will not cover completely the precise price exposure of an individual farmer at the local level. For index-based weather products, basis risk is the potential mismatch between insurance payouts and farmers' losses. Basis risk, or the effectiveness of the protection, is always an issue to be considered when dealing with index insurance such as price or weather.

In many developing countries, the usage of formal markets for risk management and insurance is restricted due to underdeveloped financial markets. For example, in many countries insurance companies have no experience in dealing with agricultural risks and are reluctant to get involved in the agricultural sector. Local futures markets exist in only a few countries and products. Furthermore, many small farmers lack the capacity to access these markets because of their size and lack of knowledge. Thus, institutional arrangements will be critical in bringing formal risk management markets to farmers and other rural people.

In addition, policy and regulatory environment directly influence the utility of risk management and insurance products and schemes. The policy environment impacts the incentives for producers to manage risks and often times creates disincentives for individuals to protect themselves against risk, such as bailouts of banks by governments and compensatory payments to farmers in times of price falls that crowd out market-based solutions.

CASE STUDY: EXTENDING LENDING THROUGH INSURANCE - THE CASE OF BASIX IN INDIA

- | | |
|-------------------------------|--|
| Cost Reduction: | <ul style="list-style-type: none">• Use of technology to cut costs of servicing rural clients¹³ |
| Risk Reduction: | <ul style="list-style-type: none">• Use of insurance to protect both the institution and the borrowers• Strict institutional guidelines for lending and portfolio diversification• Utilization of mutualization concepts through group lending |
| Culture of Innovation: | <ul style="list-style-type: none">• Management that promotes staff development and innovation• Focus on livelihoods rather than just lending |
-

Established in 1996, BASIX is a group of companies that perceives of itself as “a new generation livelihood promotion institution.”¹⁴ BASIX promotes rural livelihoods through the “Livelihood Triad” that comprises livelihood financial services (credit, savings, and insurance), human resource and institutional development services, and agricultural and business development services. BASIX has been active in India’s major agricultural sectors, with the goal to impact one million people by 2010, half directly through financial services and another half indirectly through “collaborative polygons,” which are vertically-integrated, non-financial services such as input supply, market linkages, and agroprocessing. Due to its scale, commercial orientation, and innovative approach to rural financing, BASIX has emerged as a leading rural development institution in India.

Innovation

BASIX aims to expand lending in rural areas while being competitive in attracting investment from the mainstream capital markets. To that end, the institution places a dual emphasis on financial sustainability and operational efficiency. In addition to applying information technology to enhance productivity and reduce costs, BASIX has implemented several innovative risk mitigation techniques:

Utilization of group-specific lending methodologies to increase repayments

BASIX classifies clients into three main groups and serves them with three lending methodologies: lending to the “poor” through SHGs, lending to the “marginally poor” through joint-liability groups (JLGs), and lending to the “not so poor” through individual loans. By lending to groups instead of individuals, BASIX is able to reduce defaults by enforcing the collective savings principle and better monitoring borrowers through peer pressure.

Portfolio limits and standard operating procedures that mitigate BASIX’s aggregate risk.

To diversify portfolio risk across sectors, BASIX balances 45 percent of farm and animal husbandry loans with 45 percent of non-farm loans and 10 percent of loans for general purposes, such as lending to SHGs. BASIX’s well-defined operating procedures are designed to build reputations for farmers and the institution itself. All customers must start with a small loan and “graduate” to larger amounts based on repayment records. Meanwhile, BASIX also seeks to build a strong reputation by pursuing legal enforcement in default cases instead of rescheduling loans. This, in turn, fosters a repayment culture among BASIX’s clients.

Insuring customers’ risks to reduce BASIX’s own risk.

BASIX offer loans in conjunction with several insurance products including: a) a group term life insurance product under the “CreditPlus” Scheme, which provides a payment equivalent to 150 percent of loan principal to the surviving families of insured borrowers; b) a cattle insurance plan that provides death coverage of livestock with the animals insured for full market value; and c) a weather index insurance product that triggers automatic payments to farm borrowers in the event of rainfall deficits.

In the 2003 pilot in Andhra Pradesh (A.P.), BASIX intermediated to castor and groundnut farmers weather insurance contracts that will trigger prompt payouts when rainfall falls below the trigger level in each respective crop-specific rainfall index. ICICI Lombard, which underwrote the insurance policies, reinsured the risks with an international reinsurance company. Weather insurance is an innovation that allows BASIX to hedge its portfolio in areas where crop yields (and thus repayment rates) are highly correlated with rainfall. The product was designed and developed in partnership with ICICI Lombard, a leading Indian insurance company, with technical assistance from the Commodity Risk Management Group (CRMG) of the World Bank. The deal marked the first time that an agricultural finance institution transferred the systemic risk of its crop lending portfolio to the international weather risk markets.

Performance

BASIX has been successful in extensively coupling insurance products with new loans. Piloted in 2002, the CreditPlus Scheme had insured nearly 56,000 BASIX’s borrowers by March 2004, and is now mandatory for all direct loans. In addition, BASIX has become a corporate agent of Aviva, a UK-based insurance company, and now sells three rural-specific life insurance policies to its clients. BASIX also has been successful in pioneering the weather insurance product. The number of rainfall-indexed policies sold by BASIX increased substantially from 230 in two A.P. districts in 2003 to 427 in three A.P. districts in 2004. In 2005, BASIX plans to reach the target of selling 7,000 - 10,000 weather insurance policies

across its 50 branches in seven Indian states. Given the short timeframe of implementation, it is still premature to draw definitive conclusions. However, two indicators illustrate the value of weather insurance for both BASIX and its borrowers. First, a number of farmers who purchased rainfall-indexed policies for the 2004 monsoon seasons were repeat buyers from 2003. Second, the availability of a weather-linked portfolio hedge was an important factor in BASIX's decision to continue lending to agriculture in drought-prone areas.

Risk and Cost Reduction

A combination of two strategies has allowed BASIX to effectively manage risk. First, BASIX reduces its institutional-level risk through an appropriate mix of lending methodologies and portfolio limits. Second, BASIX helps customers mitigate their own risks through the integration of credit and insurance, thus reducing the company's exposure to defaults. This two-pronged approach provides a risk management model that is replicable for other institutions.

What underlines BASIX's initiatives is the institutional culture of innovation, embedded in both the leadership's values and governance structure. BASIX encourages high performance and rewards creativity through various policies, including a new hire training program that exposes new staff to extensive field work and accelerates learning through company representation in public events; a performance-based compensation system; and learning and sharing mechanisms across the BASIX group and with third parties.

Two real challenges remain for BASIX in order to balance rural outreach with financial soundness. First, BASIX must scale up the weather insurance scheme to cover all rural loans to adequately protect its portfolio while broadening the impact of insurance on farm clients. Second, BASIX must pass along the true costs of weathering insurance to rural borrowers. This can be achieved by charging a slightly higher interest rate for repayment amounts indexed to rainfall to reflect the market-rate premium, thus ensuring BASIX's long-term financial sustainability as an insurance intermediary.

Sustainability and Replicability

Looking broadly at the BASIX organizations, their innovative activities have become well known throughout the rural finance and microfinance communities. Their operations are being used by other microfinance and rural finance organizations as examples in innovation.

More specifically with regard to weather insurance, given the limited scale of the pilot programs to date, it is premature to draw definitive conclusions on the performance and impact of weather insurance. However, two indicators illustrate the value of weather insurance for agricultural finance. First, a number of farmers who purchased rainfall-indexed policies for the 2004 monsoon seasons were repeat buyers from 2003. Second, the 2003 pilot seemed to spark much broader interest in weather-indexed insurance in India; since the initial pilot, a number of other private insurance companies beyond ICICI Lombard have entered the market and have been selling weather insurance policies throughout India. The CRMG is testing the replicability of this model in other countries including the Ukraine, Malawi, Ethiopia, and Nicaragua. All of these activities are in the pilot stages and their results, as well as the India pilot, should provide some more information on the replicability of this model in a larger number of countries and sectors.

CASE STUDY: MANAGING RISK IN THE COTTON AND COFFEE SECTORS - THE CASE OF CRDB BANK TANZANIA

- Risk Reduction:**
- Implementation of collateral management program for production risk
 - Use of price risk management for managing exposure of clients and bank to price volatility
 - “Hands-on” approach for clients through use of relationship managers
- Culture of Innovation:**
- Management that promotes staff development and innovation
-

In Tanzania, the agricultural sector generates nearly half of the country’s GDP. CRDB is the largest local bank lending to agriculture with a portfolio of more than US\$60 million (2003 and 2004). Originally a state-owned rural development bank, it was privatized in 1996 and has since become profitable while retaining its involvement in agriculture. It is heavily involved in the cotton and coffee sectors, with lending in 2004 and 2005 at approximately US\$16 million for coffee and close to US\$20 million for cotton. Together these sectors contribute 10 percent of Tanzania’s export earnings and support more than a million households. CRDB faces high levels of exposure to price volatility because its borrowers, particularly those that are cooperative unions, are exposed to price risk. Most other banks and multinationals operating locally have withdrawn from agricultural lending because of high levels of risk. In a competitive banking environment, CRDB sees the agricultural sector as an opportunity to grow its business. As a local bank that places a high premium on relationship lending, the bank believes it has a comparative advantage in the sector.

Innovation

CRDB faces high levels of price risk due to volatility in the coffee and cotton markets. In the past these high levels of risk have forced CRDB to maintain high levels of loan loss provisions and reschedule many of its agricultural loans. To protect itself from default, CRDB has been participating in the government export guarantee fund for its cooperative clients, but this participation has been declining in recent years because the program is costly and there are difficulties in actualizing payouts in times of default. Because CRDB is committed to staying in the agricultural sector and providing financing to both cooperative and private clients, it has begun looking for innovative ways to manage price risk for these commodities. The strategy that CRDB has adopted combines traditional collateral management with innovative instruments for managing price risk. The key to success of both of these techniques is CRDB’s staff of relationship managers, who take a unique hands-on approach to managing client accounts.

Collateral management

Collateral management was instituted by CRDB as an attempt to expand credit lines to clients who lacked either balance sheet or asset base to support the credit exposure required to fund working capital lines needed for effective preharvest financing and seasonal operations. CRDB requires that all coffee and cotton clients utilize collateral management arrangements with either private collateral companies or through processing facilities. Under this system, CRDB extends funds to clients through a revolving line of credit. The first advance to clients is a minimal level of capital to be used to start purchasing the product at the beginning of the season. Once the goods are placed in the registered warehouse, in the case of cotton, or authorized mill in the case of coffee, CRDB will release additional funds equal to the value of the commodity in the warehouse based on the current market price. CRDB will not release funds at a level higher than the value of the physical collateral.

Price risk management

Even with control of the physical goods, CRDB is exposed to price volatility since changes in the market price can bring about significant decreases in the value of the goods in the warehouse. In an effort to manage price risk CRDB has been working to gain access to international markets for price hedging, on New York Board of Trade (NYBOT) for cotton and both NYBOT and London International Financial Futures & Options Exchange (LIFFE) for coffee. Most of CRDB's clients in coffee and cotton are exposed to price risk since they agree to purchase the product at a fixed price from producers before they have sold to exporters or traders. If the price moves down between the time of purchase and sale, they run the risk of incurring losses. CRDB has recognized that market-based price risk management can help clients hedge the risk of these trading exposures. By purchasing options contracts on the international market, CRDB, on behalf of their clients, can lock in a floor price that provides protection from downward price movements in between the time of purchase and sale. Generally, clients are encouraged to buy put options, which protect the approximate international market price equivalent of their financial breakeven (purchase price + costs to market).

Relationship managers

The key to CRDB's successful use of these instruments is the in-depth involvement of CRDB staff. CRDB's "relationship managers" know the details of each client's business and provide expertise to clients on ways to more efficiently manage the business and the risk. CRDB staff actively work with clients to mitigate risks as well as increase profitability with the belief that by improving the way clients are doing business they not only manage risk but also provide value-added services that will attract new customers to the bank.

Performance

In the first years of its introduction, collateral management was optional for borrowers, but CRDB now requires that it is utilized by all clients in cotton and coffee. On the price risk management side, the work is in initial pilot stages. CRDB saw its first client enter into a price risk management contract in 2004 and is looking for more to be involved during the 2005 marketing season. The bank recognizes, however, that hedging is opportunistic and market prices will not always be at favorable levels. The bank also recognizes that capacity on these issues is low and that it will take time for clients to fully take advantage of the product and service. CRDB is working to get a greater number of its clients to first recognize price risk, and then be able to quantify and monitor it, and finally learn to manage it using either physical or financial risk management solutions. Physical solutions may involve changing the timing and pricing formulas of physical sales contracts, or entering into sales contracts that have guaranteed minimum price floors (in a sense, a physical put option). The bank has invested its own resources to give staff and clients capacity on risk assessment and the use of various risk management techniques. CRDB, with the help of the World Bank and the International Task Force on Commodity Risk Management (CRM) has concentrated on building internal capacity within its Corporate Clients and Treasury Departments and has succeeded in training management and key personnel in the mechanics of price risk management.

Risk and Cost Reduction

CRDB has developed a strategy for managing two of the major commodity risks associated with its lending operations. Through collateral management, CRDB has been able to expand lending to clients beyond the limits that would be in effect if the bank was only lending against assets. At the same time, CRDB is actively working to minimize the price exposure of its borrowers. When borrowers suffer trading losses as a result of price risk mismanagement, the bank is impacted directly. As mentioned above, the price risk management program is in the nascent stages and it is too early to judge its

performance, but CRDB sees price risk management as essential to its long-term ability to continue lending in the cotton and coffee sector.

One of the most important risk-reducing components of CRDB's operations is the detailed involvement of CRDB's relationship managers with clients. By working closely with clients, CRDB's relationship managers are able to understand when clients are creating risk and discuss ways to mitigate or manage that risk. The bank's staff have a solid understanding of cotton and coffee production and marketing issues and will react to limit lending or withdraw lending when a client's business practices create risk beyond a level at which the bank is comfortable. For the bank itself, the costs of operating these programs are absorbed because without them, the bank would not be able to maintain lending operations in the cotton and coffee sectors. For the borrower, costs in the future could be offset by lower interest rates that CRDB is offering for clients who participate in the price risk management program.

Sustainability and Replicability

CRDB's use of collateral management is not uncommon and banks throughout the world have been using collateral managers to mitigate yield risk in lending. While this model limits the amount of preharvest lending given, it is one way by which physical goods can be used as collateral.

In terms of price risk, CRDB is encouraging, where appropriate, a greater number of their clients to hedge their risk. After the initial pilot year that occurred in 2004, CRDB is looking to the upcoming cotton and coffee crop season for both coffee cooperatives and cotton gins to manage their exposure to price volatility through the use of options contracts. The CRM group at the World Bank is currently working to see if this model is applicable with banks and businesses in the commodities' sectors in other countries.

CASE STUDY: THE ROLE OF SELF-INSURANCE FUNDS IN PROVIDING CREDIT - THE CASE OF THE FONDOS IN MEXICO

Cost Reduction:	<ul style="list-style-type: none">• Pooling of risk by self-selecting farmer groups
Risk Reduction:	<ul style="list-style-type: none">• Use of reinsurance to protect against covariant and extreme risks• Utilization of joint liability concepts to mitigate the impacts of asymmetric information and moral hazard of crop insurance
Culture of Innovation:	<ul style="list-style-type: none">• Government supports less costly alternative to state agricultural insurance• Responsibility is left at community level to assess loss and payouts

In Mexico, access to formal credit for the rural households, especially those involved in agricultural activities, is scarce. Farmers in Mexico have little liquidity in general and lack traditional collateral that might be acceptable in the formal banking sector. One of the biggest risks they face is yield risk.

To address this, in 1961 the Mexican Government established a public agricultural insurance program to provide multiperil risk insurance to all farmers that receive credit from the official development bank, including producers from marginal producing areas with high probability of facing a negative weather shock. This strategy of extending insurance to marginal rain fed areas had a negative cross-subsidy effect on the most productive farmers that eventually resulted in their demands for an insurance product that targets the specific groups or communities. This laid the foundation for the establishment of the Fondos. Fondos offer farmers the opportunity to access financing by providing banks and financiers with additional security in case of a loss in yield.

Innovation

Fondos are nonprofit organizations of farmers in civil associations who have expressed their willingness to work together to manage their risk. These are self-selecting groups that combine two insurance principles, risk pooling and reinsurance, to protect individual members against named perils. Fondos pool crop yield risks among farmers with similar risk profiles, utilizing strict insurance market principles, including proper underwriting of risks based on technical principles, constitution and investment of adequate financial reserves, loss adjustment procedures based on technical guidelines, and rates developed according to sound actuarial methodologies.

Risk Pooling

Risk pooling creates financial reserves in “good events” and uses this capital to payout when yield is affected. It takes advantage of mutualization to foster organizational principles and structure incentives to keep transaction costs under control. Much like microfinance, by organizing farmers into groups, social and community pressure and localized oversight can manage disincentives and moral hazard. For instance a farmer is less likely to overstate drought losses to his neighbor than to an insurance adjustor.

Reinsurance

But while risk pooling is efficient in dealing with idiosyncratic and non-catastrophic risks, it is inefficient and may become insolvent in times of covariant risk. As a result, Fondos reinsure these pools against more covariant risks through Agrosemex, a government supported reinsurer. By taking actuarial-based reinsurance for those risks that it cannot retain, Fondos can manage covariant risk. For this reinsurance it pays a premium and payouts would be triggered when specific criteria in the reinsurance agreement are met.

The Fondos are not operating on a purely commercial basis, and at present the Mexican government subsidizes the premiums for participating farmers.¹⁵ While this subsidy does not invalidate the model of combining risk pooling with actuarial-based reinsurance, it should be considered when thinking about how this type of program could be replicated in other countries. The crop insurance system in Mexico focuses on agricultural regions with productive potential and financial viability and as a result subsistence and poor noncommercial farmers are excluded from the Fondos and should be covered through the government-sponsored national disaster scheme Fondo Nacional de Desastres Naturales (FONDEN).

Performance

The development of Fondos has allowed the government to decrease its share of the cost of the agriculture insurance program (including subsidies to the premium or any other hidden subsidies to operation costs or capitalization programs to state owned agencies related to the agriculture insurance scheme) to about 30 – 35 percent, while its participation was more than 60 percent during the decade of 1990–2001 when the state-owned government company operated as a direct insurer.¹⁶

The total liability of the Fondos on an annual basis was approximately US\$407 million in 2003. The Fondos system on average has operated with positive financial results. From a pure cash flow analysis (including premiums paid by the farmers and premium subsidies), Fondos has operated with a loss ratio (total indemnities/total premiums) of 53 percent on an annual consolidated basis,¹⁷ while it is estimated that this result would be 73 percent without subsidies (i.e., total indemnities/[total premiums–premium subsidies]). With Fondos operating with a cap for administrative expenses of 19 percent of total premiums and their average expense for reinsurance has been 25 percent, the combined ratio¹⁸ for the system is estimated at 96.5 percent with subsidies and 116 percent without subsidies. The Fondos system has been

profitable at the reinsurance level, as the reinsurance loss ratio averaged 52.1 percent on a consolidated basis.¹⁹

There is some moral hazard at the Fondos management level. There have been cases of fraud and theft of revenues. Clearly, governance and social capital are critical for the sustainability of the organization's good performance. Finally, the supervision and support by Agrosemex and regulators were critical for the Fondos performance.

Risk and Cost Reduction

Fondos by design cut moral hazard among members, which in turn reduces the cost of the product. In traditional crop insurance, asymmetric information and moral hazard have resulted in excessively high premiums and ineffective coverage. But the Fondos system melds this traditional approach by requiring actuarial costing and structured rules, with risk pooling in order to avoid these same pitfalls. The mutual confidence and common interest among community members that sparked the creation of Fondos also has reduced the costs of asymmetric information and moral hazard and therefore the premium for this insurance.

While Fondos seem to decrease the costs of agricultural insurance programs over traditional insurance programs, one of their biggest benefits could be the cost reduction that they bring to banks. By mitigating the yield risk associated with lending, banks could possibly look to incorporate additional clients into their operations or reduce the rates they charge clients.

Sustainability and Replicability

The sustainability of the Fondos as an alternative to other types of insurance can be seen by looking at the efficiencies gained in terms of transaction cost and risk reduction, specifically, 1) the 52.7 percent loss ratio for the Fondos while the average historic loss ratio for Agrosemex (government-owned insurance company) as a direct insurer was 75 percent (1990 - 2001) and private insurance companies historic loss ratio has been more than 80 percent (Ibarra 2003), and 2) Fondos administrative cost of 18.8 percent of the total premiums versus private insurance companies with an administration expense ratio of more than 30 percent (including cost of agents). These statistics are more salient when put it in perspective of the size of clientele. Policy holders from Fondos average 8 hectares of land versus policy holders for private companies who average 59.1 hectares.

The Fondos in Mexico could be replicated in other middle income countries, or even low income countries given they meet a general set of prerequisites in order to have an opportunity for success. These prerequisites include:

- A productive agricultural sector where insurance will be used to protect a viable activity not incentivize an unproductive one
- The ability to save collectively in order for the community to build reserves that can be used to smooth collective losses intertemporally
- Reinsurance to finance catastrophic losses, by design, self-insurance funds cannot absorb catastrophic losses
- Credibility from the formal financial sector that insurance will provide greater access to credit
- The availability of technical expertise, particularly in the initial stages of the operation and for oversight in the establishment of rules guiding the mutualization of risk.

5. THE USE OF TECHNOLOGY TO EXTEND AGRICULTURAL LENDING

New and creative ways to utilize information communication technology are emerging and evolving every day, broadening its applicability in the extension of financial services. While many of these applications are highly innovative, they often cannot overcome the specific barriers that limit the provision of finance in the agricultural sector. This section focuses on the areas where technology could be used to improve and create greater efficiency in business processes that are specifically rural and more specifically agricultural. Unlike the previous three vectors of innovation, past experience within this vector has been limited in developing countries and many technology projects remain in the nascent phases. As a result, this section is designed to identify the key areas where technology could improve the provision of financing and the main areas of promise for innovation. This section will also look at the importance of institutional capacity to implement technology projects as well as the cost efficiencies that can be gained by leveraging a single technological platform for multiple uses. Finally it will describe the key roles for government, donors, private sector companies, and local institutions in promoting efficient use of technology.

TECHNOLOGY AND AGRICULTURAL CREDIT

To date, the use of technology to gain cost efficiencies and improve feasibility of providing finance to the agricultural sector has been limited. But there are a number of promising areas where technology, when combined with business activities of extending credit, can provide advantages that traditional banks and other rural credit providers business have not. In these areas technology alone is not the solution, but rather, it is an enabler for business innovations. Looking from a strictly agricultural perspective, there are six key areas where technological innovation could provide greater institutional efficiency and, either directly or indirectly, provide greater access to credit or financial services.

Client access to savings, credit, or insurance products

Technologies applied appropriately to the delivery of credit, savings, and insurance services have enormous potential to reduce the cost of delivery and risks associated with handling and moving cash, enable better targeting and diversification of products and services, as well as provide the market intelligence to manage risk more effectively. The costs of service delivery, especially in rural areas, are influenced by physical infrastructure, labor costs, internal management efficiency, and the overall regulatory regime, as well as the costs of risk. In locations with some physical infrastructure, including telecommunications and adequate transportation, delivery can be made more efficient by maximizing the use of that infrastructure, whereas in those areas where transportation infrastructure is poor, the most efficient model may be to enable remote data devices, such as hand-held devices.

Client access to market and product information

In order for farmers and agribusinesses to be competitive in marketing their products, it is important to have access to up-to-date market information. Specifically, market information enables them to sell products more competitively, demand higher prices in the local and export markets, accurately estimate product value, access preferential markets, and in some cases, more effectively manage their risk.

Wireless communication and related technologies continue to increase and diversify the way that farmers can affordably access product, weather, growing, and pricing information in the local or national markets as well as international markets.

Collateral management

Farmers and agribusinesses generally lack traditional collateral such as physical assets and often have tenuous title to the land. Consequently they are not able to meet the strict requirements of banks to secure loans. The principal asset that most producers and agribusinesses do have is their production. The first section of this paper talked extensively about warehouse receipts that give banks and financiers the right to the goods in case of default. More traditional means of collateral management also provide this type of security. Using technology to improve the efficiency and transparency of these systems, such as monitoring flows of physical stocks in and out of warehouses, or creating transparency and real time information access regarding commodity values and title, will not only improve the ability of banks and financiers to lend more securely, but could also enable access to finance in a more timely and objective way.

Institutional management information systems

Financial institutions require capital to grow and expand; however, to access more capital they need quality information about current assets. In addition, effectively managing this growth requires tighter controls and better means to manage and use the information. Due to manual and decentralized systems, institutional information is generally not complete, reliable, or even available, especially for smaller institutions. The investment in a quality management information system (MIS) is significant, including the necessary hardware and software, plus the internal daily application support and data management, consulting services, and overall staff training on its use, as well as the on-going cost of updating the software. Furthermore, to securely extend reach and scale of financial services, a centralized MIS is a must, requiring the development of a wide area network (WAN) across branches. A centralized database also helps ensure easy access to quality data for product development, market segmentation, developing credit scoring and grading systems, as well as improving marketing materials, all of which feed greater and easier access to financing for customers. Fortunately, today there are a variety of options that make accessing a full MIS solution of this quality and functionality easier and less costly.

Credit scoring

The use of credit scoring is relatively new to lending for smaller clients and nontraditional banking clientele. In the microfinance sector, scoring has shown promise as an engine for effectively managing aggressive expansion safely and could also be utilized within the rural and agricultural sectors. In recent years, institutions have benefited greatly from improved quality of information systems, significantly increasing the volume of electronically available data necessary to develop scoring models. Geographic distance and low population densities in rural areas make site visits costly and impractical for repeat customers. Consequently, use of traditional methods of credit risk assessment increases the cost of making a loan in the agricultural sector because of the large number of staff required to physically confirm identity and assess credit risk. Over time this provides no economy of scale, making growth cumbersome and dependent on identifying quality staff. Standardizing and simplifying data collection will increase the opportunity to leverage scoring technology to support volume decisioning necessary for scaling operations. A variety of solutions are now available that use hand-held technology to address problems of data collection.

Distance learning

Expanding access to agricultural finance requires scaling not only an institution's technology infrastructure, but increasing and retaining competent employees. Operating in rural areas makes it difficult and expensive for financial institutions to bring staff into the capital city, in addition to significantly increasing the amount of time employees are away from their regular duties. In order to reduce opportunity costs of financial services providers and increase the practicality of the training provided, institutions have pilot tested the use of distance learning delivery strategies. By decentralizing learning opportunities, access to learning and the application of the learning in the work place can be increased. In addition, by using distance learning technologies institutions can take advantage of investments already made in computers and connectivity, while lowering their per employee cost of training.

EXTENDING FINANCIAL SERVICES THROUGH TECHNOLOGY

Technology²⁰ is not cheap and generally increases operating costs. Why is technology often touted as saving money? The reduction in costs is obtained in two key ways—through lower per unit costs and higher volume productivity. For example, by using technology to streamline business processing an institution could reduce the time required to disburse loans from 5 to 2 days. That translates into a 40 percent increase in the number of loans disbursed. Not only is the disbursement cost per dollar of credit lowered, but revenues are increased as loan capital is turned over more quickly. Additional savings may be made as well from a reduced reserve requirement and tighter liquidity management. Consequently, through greater efficiencies and higher productivity, cost savings are gained despite overall increases in the operating budget related to technology.

The second primary benefit of using technology is indirect improvement of operations through better risk management. Technology enables institutions to collect data in electronic format that can be synthesized and analyzed to identify trends, such as delinquency or yields, assess individual creditworthiness through payment histories—savings and credit - as well as develop scoring models and potentially develop insurance products. The larger the data repositories, the easier it is to spread risk across larger risk groups. In order for the industry to scale up, it is imperative that risk—lending, yield, natural disaster, and food security - be assessed across larger and larger pools of individuals. Technology can be used to create local data repositories that can be aggregated through data consortia to form broader data sets and more statistically significant risk mitigation analysis. Sharing data and risk models can open the door to sharing actual risk, which can lead to greater access of financial products and services for rural producers.

By leveraging information communication technologies, financial institutions can extend their reach to create flexible, far-reaching financial service delivery channels more suited to rural areas than traditional banking.

The return on investment in information technology depends directly on the means by which an institution is accessing and using the technology. The degree to which new business models are created, old business processes reinvented, partnerships formed, and delivery channels and infrastructure shared is directly proportional to the value gained from an investment in technology. Table 5.1 demonstrates how this investment in technology can be used.

Table 5.1: Using Technology In Agricultural Business Practices To Address Limitations In Lending

<i>Problem</i>	<i>Impact</i>	<i>Mitigation</i>	<i>Agricultural Business Process</i>
Poor infrastructure and geographically dispersed clients	<ul style="list-style-type: none"> • Reaching rural clients is difficult and formal financial services reach those closest to the urban centers. • Cost to clients of banking in the formal sector are prohibitive. • Close monitoring of lending and portfolio by lenders is difficult. 	Electronic data transferred via automated teller machine (ATM), point-of-sale (POS), mobile phones, interactive voice response (IVR), Internet banking, smart cards.	<ul style="list-style-type: none"> ▪ Loan disbursements. ▪ Savings deposits and withdrawals. ▪ Product servicing, disbursements, and collections. ▪ Customer acquisition and retention. ▪ Client access to account or branch information. ▪ Client driven transactions, 24/7. ▪ Remittance transactions. ▪ On and offline transactions, including withdrawals.
Lack of credit history and information	<ul style="list-style-type: none"> • Limited credit history keeps banks away from rural clients. • Without credit information collateral requirements increase. • Difficulty building credit databases because of costs associated with accessing information from rural clients, including identity verification. 	Scoring, biometrics technology.	<ul style="list-style-type: none"> ▪ Building credit histories and data repositories. ▪ Loan origination—loan application processing and approval. ▪ Product servicing—collections. ▪ Customer retention—loyalty programs and incentives. ▪ Client identification (with biometrics). ▪ Client and agent authentication with personal identification numbers (PINs).
Poor quality collateral	Banks limit lending to rural clients because the ability to use collateral is uncertain.	Scanning, personal digital assistants (PDAs), mobile phones, Internet.	<ul style="list-style-type: none"> ▪ Collateral management. ▪ Tracking physical goods, warehouse receipts, and

Table 5.1: Using Technology In Agricultural Business Practices To Address Limitations In Lending			
<i>Problem</i>	<i>Impact</i>	<i>Mitigation</i>	<i>Agricultural Business Process</i>
			purchase and sale of goods.
Limited price information and price risk	<ul style="list-style-type: none"> • Risk of defaults due to price swings events limits lending. • Lack of business acumen and information forces growers to sell suboptimally and not optimize premium or direct contracting. 	Distance learning, scanning, Internet outlets, mobile phones, PDAs.	<ul style="list-style-type: none"> ▪ Improving business development and product market of clients. ▪ Improving market awareness and negotiation power ▪ Market information. ▪ Financial product marketing ▪ Securing premium contracts (EUROGAP). ▪ Certification to origin.
Lack of capacity among rural bankers and staff	Difficulty in managing borrowers portfolios, implementing best practices, and new initiatives limits lending products	Distance learning, Internet, hand-helds.	<ul style="list-style-type: none"> ▪ Employee training ▪ Performance monitoring
<i>Source:</i> Frederick and Dailey 2005			

PREREQUISITES AND CHALLENGES FOR TECHNOLOGY USE

Challenges for the integration of technology into the operations of rural financial service providers remain difficult. Expanded use of technology in rural areas must be explored, keeping in mind that the road and power infrastructure are lagging behind, expertise on the use and maintenance of technology infrastructure is low, and initial start-up costs for technology can be quite high. These challenges impose unique requirements for appropriate, reliable, and affordable technology solutions in this context.

Fortunately, there are a variety of solutions available today to address some of these issues. For example, due to innovations in solar, wind, and bike power there are viable alternatives to generators. In addition, the current generation of computing devices (hand-helds, POS units, mobile phones, electronic tablets, and pen scanners) is being made to do more with less power, even building in power saving features. Moreover, institutions can move away from a space-based means of branch extension toward lower-cost delivery models, leveraging connectivity, hand-held devices, and partnerships. Several different strategies are emerging in the industry, such as the creation of virtual branches through an agent network, mobile banking units, and establishing low infrastructure satellite branches.

While solutions can be identified to address the challenges of using technology in rural areas, the success or failure of the technological innovation most often hinges on the institutional strength and capacity of the organizations supporting its implementation. Due to the high initial costs involved and limited previous experience with the integration of different technologies with business processes, there are a number of institutional prerequisites that if in place can serve to give technology projects the greatest chance of achieving the desired outcome.

Management leadership

Leadership by business managers is the most critical factor for the successful deployment of technology. Key decisions regarding technology strategy and initiatives must be made by the most senior executives, and not left to the information technology (IT) managers. While IT managers may have the most expertise on a specific technology, they must work together with senior management to build the business case to select the most appropriate technology to achieve their strategic objectives. But ultimately, senior management must make the decision as to which technology solution or approach best fulfills all the business requirements of the institution and ensure that business value is returned.

Development of people

Innovating business practices—in this case, extending access to agricultural finance - relies on having motivated, trained, and empowered staff. Without the right people to implement these strategies, IT will be useless. Sufficient resources must be allocated to communicate the changes being implemented and the progress being made, prepare staff for their new roles and responsibilities, provide the necessary training on the new technology and processes, and properly align employee incentives with the new ways of doing business. Failing to invest in people will bring resistance, causing problems and delays in the transition, in some cases outright rejection of the system by employees, increasing the cost of the solution and the risk of success, eroding the value of the investment, and requiring more management attention to be directed away from other activities.

Invest in a culture of change

Implementing a new business strategy and technology solution requires significant effort and will affect everyone—employees, customers, even suppliers in one way or another. An organizational culture that embraces change is a direct result of management leadership and modeling. Management must mentor and guide staff through periods of transition, involving staff in defining the changes, communicating

effectively the rationale for the changes and the future vision for the technology solution, as well as providing a safe learning environment to embrace the new ways of doing business and break from the old ways (Russo 1996). Having a clear vision of the benefits and having a sense of ownership in the new business strategy will motivate employees to implement the necessary changes and utilize the new technology most effectively.

Appropriate expertise

Getting quality TA and consulting throughout an IT implementation process is imperative. Most financial institutions working in local communities do not have all the necessary skills in-house to analyze, conceive, design, implement, and evaluate an IT solution successfully. Efficiencies can be gained by leveraging the expertise of those who have done a similar implementation project before, whether these services are purchased directly from the providing vendor or a third party entity. Institutions should expect to pay three to six times the value of the hardware and software on project management, technical support, training, and consulting services when piloting or rolling out a technology solution. Budgets should reflect this need for sufficient skills and expertise to ensure the successful uptake of the technology and return on investment. In today's financial services' market there are sufficient resources and expertise available for these types of initiatives; financial institutions need only to properly seek out the expertise and ensure sufficient funding.

Shared infrastructure

Generally the greatest barrier to technology is the cost. Operating in rural areas means volumes are lower and outreach is even more expensive. Sharing infrastructure such as power, telecommunication, data networks, hosting, application support, or data management drives down the technology costs making it affordable to deliver financial products and services to rural areas. The more points of access and diversity of products an institution can create to increase frequency of usage raises the value of these shared strategies and justifies the initial capital investments to build them. Being solely responsible for the life cycle of an IT solution is expensive and drains institutional focus and energy. Strategies that share infrastructure decrease per unit costs, build value, and leverage economies of scale for expansion of credit delivery.

Need to build partnerships

The key to success for innovative technology initiatives is building partnerships and reinventing ways of doing business that fulfill customer demands. By building multiparty relationships, institutions are able to leverage and share infrastructure, investments, and expertise as well as social and human capital to reduce costs, lower risks, and expand client services. Only in this way will financial institutions be able to afford and sustain access and delivery of a diverse range of financial products and services that meet the needs of rural, agribased clients. Furthermore as noted by Zeller, specific rural financial projects should be pursued from a financial system perspective, implying that public action and public-private sector partnerships are required to foster horizontal and vertical integration within a decentralized rural financial system (Zeller 2003). Achieving integration of financial systems requires not only adhering to international technology standards, but more importantly building the necessary cross-sector relationships and agreements under which a financial system will operate. This increases the complexity and the cost of implementing these types of projects, which most institutions cannot bear alone, continuing to point to the need for industry solutions, at least at the national level, not simply solutions for one financial institution.

Experimenting with innovation, particularly in rural environments, is risky, expensive, and does not necessarily warrant sufficient profits to justify the investment. This is especially true for private companies, either financial institutions or technology providers that are expected to return shareholder value, with many ideas and market segments competing for the scarce research and development dollars.

Consequently, financial institutions and private sector companies may require outside research dollars to provide the proper incentives to undertake experimentation in this area. Coupling private sector leadership backed by public sector resources for inventing new ways of reaching the rural poor appears to be a strong model. Many of the technology initiatives described in the background paper are being driven by large, private sector companies that bring rigorous business discipline and expertise to the oversight and management of these experimental initiatives, which is helping to increase the success rate, shorten the pilot periods, and raise the visibility of this work.

Getting beyond the pilot phase with some of these innovations in the industry is essential to reaching scale in the industry. This will require collaboration not only with large-scale sponsors or donors, but governments as well, designing appropriate solutions for rapidly changing information and communication technologies' (ICT) environments, leveraging connectivity as much as possible, and sufficiently aligning implementation strategies with business strategies of the financial institutions.

Role of local banks and institutions

In order for financial institutions to take advantage of the latest technology, it is essential that they clearly identify their business problems and goals, properly assess internal resources and institutional capacity, as well as the external competitive and infrastructure environments. In addition, they must conduct sufficient due diligence before making any technology choice. Once a business strategy and the supporting technology solution have been selected, it is imperative that the institutions aggressively manage the implementation of the solution to gain the greatest return on investment. According to the *Harvard Business Review*, most organizations are not generating the value that they could be from investments in IT. *Darwin* magazine notes a 30 percent failure rate for IT implementations in private sector companies. Companies that manage their IT investments more successfully generate returns as much as 40 percent higher than those of their competitors (Ross 2002). Having qualified project management skills may seem excessive up front, but will save significant resources throughout the process. As noted previously, management must also focus on leadership, the development of people, building a culture of change, acquiring expertise, collaborating with partners, and sharing infrastructure to cost effectively access and use technology.

CASE STUDY: INDIAN TOBACCO COMPANY E-CHOUPALS - BUILDING A SCALABLE RURAL INTERNET PLATFORM

Cost Reduction: • Electronic workstations provide market information and buying posts

The Indian Tobacco Company (ITC) is a group of companies with annual revenues of more than US\$2.5 billion whose activities span fast-moving consumer goods, hotels, paperboards and packaging, and agribusiness.²¹ ITC's International Business Division (IBD) has annual revenues of more than US\$150 million and is the second largest exporter of agriproducts in India (World Resources Institute). Some of the main business challenges that IBD faces are fragmented farms, weak infrastructure, and numerous layers of traders and petty traders within the supply chain. As a result, IBD has developed the *e-Choupal* system to manage these constraints and also provide greater value to its customers (World Resources Institute). So far ITC's e-Choupal platform has proven itself as a sales and procurement channel and is looking to expand that success into the provision of agricultural finance.

Innovation

IBD has deployed e-Choupals (loosely translated as "electronic gathering places," or "electronic village squares") to procure agriproducts in a more efficient and less expensive manner and raise the incomes of India's vast rural population by creating new markets for consumer products. The e-Choupal is an

electronic standalone workstation that consists of a computer, a power supply, a printer, and Internet connectivity. The e-Choupal assets are owned by ITC, but located in the house of a trustworthy member of the village called a sanchalak (“operator”). The sanchalak is selected by ITC, but must be acceptable to the village at large and take a public oath to provide nondiscriminatory access to the e-Choupal. The e-Choupals offer:

- Information on weather forecasts, market prices, news affecting agriculture, and more
- Best practices on farming and risk management
- Sources from which to purchase agricultural input supplies (and consumer goods)
- Marketing opportunities for the sale of agricultural production

ITC consolidates and makes available information from sources such as the Indian Meteorological Department, government agricultural extension programs, local markets, and the Chicago Board of Trade. Input supply companies—about 25 seed, fertilizer and chemical companies to date—pay a marketing fee to ITC to sell their products over the e-Choupal platform. After reviewing the available market information farmers can decide to sell their output directly to ITC at company hubs located at about the same distance from the village as the nearest market. Selling to the ITC has a number of other benefits over local markets, including fixed prices according to quality and grade of produce and it provides electronic weighing, reimbursement of transport costs, and immediate cash payment. If a farmer decides to sell their output to the ITC, they are issued a contract on the spot by the sanchalak for delivery the next day at the ITC hub location.

Sanchalaks and the Samyojaks (ITC representatives who are responsible for the purchasing at the hub) earn a commission on the purchase of commodities from farmers and on the sale of agricultural input supplies and other consumer goods to farmers (Upton and Fuller 2003). The focus to date has been on soybean, wheat, coffee, and aquaculture (shrimp), crops that ITC selected in order to understand the dynamics of open market production, government intervention through minimum support prices (MSP), international commodity markets, and high-risk, perishable goods respectively.

Between June 2000 and July 2004, ITC established 4,500 e-Choupals covering 26,000 villages in 6 states (Madhya Pradesh, Uttar Pradesh, Andhra Pradesh, Karnataka, Maharashtra, Rajasthan). Each e-Choupal serves about 6 villages within walking distance (about a 5-kilometer radius) with a hub within about a 30-kilometer radius. The cost to ITC per e-Choupal is approximately US\$3,250 for hardware and an additional US\$3,250 for training and maintenance over a one-year period (Bakhi-Dighe 2004).

Performance

One estimate indicates that the e-Choupal-mediated transaction “shaves 6 percent off the transaction cost for both buyer and seller (Prystay 2003).” Farmers report increases in income due to better knowledge and therefore improved yields, and higher prices accessed by selling directly to ITC. “Farmers selling to ITC through an e-Choupal typically receive a higher price for their crops than they would receive through the local market system, on average about 2.5 percent higher (about US\$6 per metric ton) (Annamalai and Rao 2003).” By 2003, ITC was procuring approximately 50 percent of its soybean through e-Choupals (Upton and Fuller 2003). “ITC benefits from net procurement costs that are about 2.5 percent lower (it saves the commission fee and part of the transport costs it would otherwise pay to traders who serve as its buying agents at the local market) and it has more direct control over the quality of what it buys (Annamalai and Rao 2003).”

ITC recovers the equipment costs in the first year of operation (Annamalai and Rao 2003) after which the operation is profitable as a standalone business. Moreover, the network is expected to generate US\$20

million in additional enterprise value this year through the sales of ITC goods and services to farmers, including goods produced by other divisions such as cooking oil, salt, sugar, flour, and lamps.

Implications for Credit

ITC is looking to leverage the use of the e-Choupal system to deliver other services, in particular credit. ITC sees potential for offering credit through its network, and is working to develop an appropriate business model. In the short term, the National Bank for Agricultural and Rural Development (NABARD) will pilot lending through ITC's sanchalaks. In this joint venture ITC will take no risk, other than reputation. In the medium term, ITC would like to collaborate with microfinance institutions (MFIs) to offer group lending, blending the MFI and ITC business models to offer a lower interest rate to SHGs, JLGs, and others. The risk would fall on the third party and ITC would earn a 0.5 - 1.0 percent spread. In the long term, ITC would like to develop a credit bureau based on the transaction data from its platform. Individual farmers (potential borrowers) could request a rating, and lenders could buy the data (in its entirety or on a credit check basis).²²

CASE STUDY: USING INFORMATION TECHNOLOGY TO CUT COSTS - THE BASIX CASE

Cost Reduction:	<ul style="list-style-type: none">• Use of technology to cut costs of servicing rural clients
Risk Reduction: ²³	<ul style="list-style-type: none">• Use of insurance to protect both the institution and the borrowers• Strict institutional guidelines for lending and portfolio diversification• Utilization of mutualization concepts through group lending
Culture of Innovation:	<ul style="list-style-type: none">• Management that promotes staff development and innovation• Focus on livelihoods rather than just lending

As can be seen from the profile of BASIX in the previous section on risk management, BASIX is a leading agricultural finance institution in India. In addition to creating operational efficiency by managing its own risk and that of its clients, BASIX has achieved cost reduction primarily by applying IT initiatives to its operations. Since the company began, BASIX has been digitalizing its unit offices (UOs), which handle BASIX's rural borrowers. In 2002, BASIX established the Information Technology Solutions for Livelihoods (ITSL) Division to provide information technology solutions in order broaden and deepen outreach, reduce transaction costs, and enhance accuracy and flexibility of transactions related to microfinance and livelihood support services.

Innovation

Under ITSL's leadership, BASIX developed and implemented "Portfolio Manager," a mobile computer solution to portfolio management. Portfolio Manager consists of an easy-to-carry kit developed for use by Customer Service Agents (CSAs) in the field. The kit contains a palmtop computer,²⁴ the required application software, a mobile printer, and a modem. It allows the CSA to access and input key information and to print transaction receipts. For example, before entering a particular village, the CSA can generate reports of loan collection requirements and loans approved for disbursement in that area. While in the field, the CSA can input loan application data in real-time while talking with a potential borrower (loan decisions are made at the UO level). Before Portfolio Manager, the CSAs used to carry various manual records such as collection statements, overdue statements, different ledgers, and receipt books; the relevant reports were typically generated once per week and picked up by the CSAs at the UO. Now the CSA synchronizes his or her data with the UO back-end system daily via modem.

Portfolio Manager also incorporates a number of controls to prevent fraud. In the old system, CSAs could conceal the real number of transactions by not issuing receipts to borrowers. With Portfolio Manager, all transactions are recorded and receipts issued. In addition, the CSA does not have an on-screen choice to print a receipt for the customer until the receipt has been saved and each receipt printed with a unique number associated with it. If a CSA makes a mistake in a transaction, the CSA must “block” the transaction, inputting a specific reason for the change or cancellation, which must be approved or “cleared” by the UO. Finally, text files transmitted by modem for integration with the UO database are encrypted, and an audit log of transactions in a mirror database is maintained on the palmtop computer.

Cost and Risk Reduction

The application of Portfolio Manager has played an important role in reducing BASIX’s transactions costs in processing rural loans. BASIX estimates direct cost savings of Rs.135,000 (US\$2,700) per year per UO due to savings from a) reduction in the number of transactions assistants processing data in the back office (Rs. 75,000 or US\$1500); reduction in use of stationery (Rs. 30,000 or US\$600); and reduction in fraud (Rs. 30,000 or US\$600). In addition to the direct savings, Portfolio Manager also broadly enhances productivity. BASIX expects that the number of accounts handled per CSA can be increased by 10 percent; this would result in a similar increase for BASIX supervisory staff and a consequent reduction in the fixed staff cost per account, and per transaction. Finally, BASIX expects a reduction in CSA travel to the UO from a minimum of four times per month (and as high as every day or every other day in peak recovery periods) to twice per month.

Sustainability and Replicability

With a planned investment of Rs. 350,000 per UO (US\$7,000) to implement Portfolio Manager, BASIX anticipates that return on investment can be achieved within 2 – 3 years. As mentioned above, BASIX expects that Portfolio Manager will contribute substantially to the organization’s cost reduction, but more time will be needed to determine if a full roll out of this pilot project will be successful.

BASIX credits the success that Portfolio Manager has had so far to a number of factors that could have implications for further replication of the system:

- 1) Selection of the IT partner and non device specific operating system
- 2) Phased-in approach deploying the software
- 3) Good project management and documentation
- 4) Involvement of end users in project development
- 5) Complete a pilot project before broader roll out
- 6) A robust yet streamlined application design
- 7) Highly interactive and user-friendly software (Rao 2003).

One of the primary limitations that BASIX is currently working to overcome with its technology partners, which also has implications for replication, is both the durability and availability of suitable “palmtops” for use in the field.

APPENDIX 1: LESSONS FROM THE PHILIPPINES GRAIN SECTOR

The production of corn in the Philippines is characterized by the seasonality of local production, the distance between supply and demand areas, and recurrent gaps in available supply, which invariably lead to wide fluctuations in prices. In the absence of a mechanism that can provide liquidity against newly harvested stocks, farmers are forced to sell immediately after harvesting when prices are at their seasonal low. Farmers also have to borrow for production and subsistence needs soon after exhausting the limited proceeds from their previous harvests, often times committing to sell subsequent harvest to their creditors at low prices or high interest charges, and further reducing their marketing options and incomes when they harvest again. At the same time, users of grains also suffer from the lack of a transparent mechanism for sourcing their stocks from producers. Because their storage and other facilities are limited and they often cannot afford to buy directly from the production areas, buyers are highly dependent on a multilayered network of brokers and traders who buy at low prices from farmers and are able to manipulate market conditions to create artificial shortages and price upswings during the off season. This not only affects consumers of corn, but feedmillers and livestock and poultry producers also end up paying higher prices for their corn inputs, which impacts meat prices.

Although the problems of corn producers and users are complex, it is clear that schemes that will allow farmers to maximize benefits from their harvests and enable users to have access to raw material requirements at reasonable prices can have significant economic impacts. There have been a series of efforts to deal with these problems through warehouse receipts and other forms of receipt financing. By looking closely at the experience of the Philippines, a number of lessons can be drawn in the development of future warehouse receipt and collateral securitization programs. While these programs have faced some obstacles, it is worthwhile analyzing what can be learned from these efforts in order to gain a better understanding of preconditions for successful innovations.

The initial warehouse receipt program in the Philippines is the Quedan system that began in the early 1970s. Table 7 shows the warehousing and related collateral management programs, including the Quedan system, that have been pursued in the Philippines, the general level of take-up, the potential benefits of these systems, and their main challenges for their growth. The development of all these programs has been an iterative process, with each one building on the previous efforts and looking to innovate in order to more effectively serve the target audiences.

As demonstrated in Table 7, the Philippine government has been quite responsive in developing new solutions as the limitations with each of these systems were identified. There is currently a limited amount of business for each of these different programs, but their development has also shown the areas which will be critical for the further growth of these programs.

LEGAL AND REGULATORY FRAMEWORK

The Quedan system in the Philippines continues to face credibility issues due to instances in the past of warehouse receipts being issued without actual deposits, or deposits being spirited out of warehouses without the corresponding Quedans cancelled or inventory loans paid off. As a result, the government body responsible for the Quedans must issue guarantees for loans extended against warehouse receipts,

hence eliminating one of the primary benefits of warehousing access to credit. Moving forward, a firm legal and regulatory framework, along with strict enforcement of laws, is necessary to establish and preserve the integrity of warehouse receipts or Quedans on which basis loans can be extended and ownership of deposits can be preserved and transferred.

FINANCING NETWORK

In the Philippines, banks have limited presence in the rural areas. This explains the low take-up of Quedan and Grains Inventory Financing Technique (GIFT)-based loans by farmer groups. As a result, the GIFT program was used by cooperatives mainly to secure cheaper storage instead of to avail of commodity financing. At the same time there is practically no affordable or available financing from informal sources that uses stocks as collateral. Warehouse and collateral systems must be coupled with credit provision because in the absence of sound financing institutions these programs will have limited scope.

INFRASTRUCTURE AND LOGISTICAL NETWORK

Commodity storage and forwarding services are commonly available in the Philippines, although they are often owned by traders and millers who may not always be willing to provide services to potential competitors. Smallholders and farmer groups have little or no access to these facilities and typically can only store their goods in warehouses made of local materials that are prone to leaks and to infestation. There is a need for facilities for warehousing, drying, land and sea transport, freight and handling, and processing that would allow even small farmers in remote areas to temporarily store their stocks in secure warehouses and subsequently transfer them to various parts of the country.

INFORMATION DISSEMINATION

One of the reasons these systems has seen limited take up has been the need for information dissemination about the benefits they could offer to farmers and market participants. Many farmers and participants in the maize supply chain simply were not aware of these programs or of the benefits that they could bring to their business. Greater access to information in addition to increased awareness and capacity building for both suppliers and buyers within the supply chain about these programs and their potential benefits could prompt greater take up.

Table A1.1: Summary Benefits and Shortcomings Associated with Warehouse Receipt and Related Systems in the Philippines

<i>Name</i>	<i>Type of System</i>	<i>Benefits</i>	<i>Take Up</i>	<i>Challenges</i>
Quedan System	Traditional warehouse receipts with additional government loan guarantee of up to 85% of the value of the loan.	<ul style="list-style-type: none"> • Provision of inventory finance. • Allow traders and farmers to store grains to avoid selling at depressed postharvest prices. • Provision of liquidity to grains traders. • Traders can secure loans and maintain activities. 	<ul style="list-style-type: none"> • Utilized by large traders. • Limited access by small producers and traders. 	<ul style="list-style-type: none"> • Difficulties in getting loans based on receipts. • Must provide direct guarantees against defaults on loans secured for banks to lend. • Requires ownership or access to privately managed secure warehouses.
National Food Authority (NFA) Farmers Incentive Rice (FAIR) Purchase Program	Repurchase program for paddy rice, up to 25% of the rice recovery from the paddy stocks sold to agency in the preceding year.	<ul style="list-style-type: none"> • Could make profits if the repurchase is done during the non-harvest months when rice prices usually rise. 	<ul style="list-style-type: none"> • Limited and varied. 	<ul style="list-style-type: none"> • Local traders may offer higher prices and/or better selling terms compared to the buying procedures of the NFA. • NFA rice stocks are also perceived to be of low quality. • Restrictions on the resale of stocks.

Table A1.1: Summary Benefits and Shortcomings Associated with Warehouse Receipt and Related Systems in the Philippines

<i>Name</i>	<i>Type of System</i>	<i>Benefits</i>	<i>Take Up</i>	<i>Challenges</i>
NFA Grains Inventory Financing Technique (GIFT)	<p>Warehouse receipts program with stocks delivered to government warehouses.</p> <p>NFA provides bank guarantee by committing to liquidate deposits and remit proceeds to the lending bank.</p>	<ul style="list-style-type: none"> • Same as Quedan system. • Eliminates the need for farmers' groups to own and operate warehouses. 	<ul style="list-style-type: none"> • Participation of farmers groups has been weak. • Between Sept 1994 and Aug 1996, only 1,688 metric tons were warehoused • Mainly utilized as cheap storage. 	<ul style="list-style-type: none"> • Price paid by NFA when liquidating stocks is only 85% of buying price. • Banks imposition of regular credit criteria and regulations despite receipts. • High storage and other fees assessed by the NFA for GIFT deposits. • Access to NFA warehouses.
NFA Farmers Option to Buy Back (FOBB) Scheme	<p>Farmers and organizations can sell stocks to NFA and secure an option to repurchase such deliveries within a given period.</p>	<ul style="list-style-type: none"> • Farmer groups can take advantage of movements in prices during off season. • No loan approval and processing. • Access to warehouses. • Benefit from upside price movements. 	<ul style="list-style-type: none"> • Deliveries < 12,000 metric tons. 	<ul style="list-style-type: none"> • Farmers lack information on program. • Farmers are unwilling to speculate on prices and prefer selling outright. • NFA warehouses and procurement funds not available during peak periods.

Table A1.1: Summary Benefits and Shortcomings Associated with Warehouse Receipt and Related Systems in the Philippines

<i>Name</i>	<i>Type of System</i>	<i>Benefits</i>	<i>Take Up</i>	<i>Challenges</i>
NFA Grains Exchange Program	Deposit grain stocks in one NFA warehouse and withdraw from another.	<ul style="list-style-type: none"> • Can wait for best possible price within the country and without concerns of shipping. 	<ul style="list-style-type: none"> • Limited take up. 	<ul style="list-style-type: none"> • Lack of information on the program and mechanics. • Delays in withdrawals and poor quality of stocks. • Farmer groups lack access to brokers or sales agents at the disposal areas. • Difficulties in getting price updates and market information.
NFA Electronic System of Trading in Agriculture (e-TRADE)	Computer-based trading system that provides information exchange and clearinghouse services.	<ul style="list-style-type: none"> • Deposits in remote production areas can be swapped with stocks in the withdrawal area. • Buyers can expand sources of stocks and are assured of prompt delivery without concerns of quality and default. • Corn users minimize costs by sourcing corn when needed. 	<ul style="list-style-type: none"> • Limited take up. • In 1999 (first year) 257 metric tons were sold through the system. • Buy bids much larger than sell bids. 	<ul style="list-style-type: none"> • Lack of information about program. • Stringent quality standards for grains. • Unrealistic asking prices. • Delays in matching bids/offers. • Payment and withdrawal delays. • Lack of or poor quality of stocks at the withdrawal points.

Source: Authors

APPENDIX 2: PHYSICAL AND FINANCIAL PRICE RISK MANAGEMENT INSTRUMENTS

<i>Product</i>	<i>Benefits</i>	<i>Costs/Risks/Constraints</i>	<i>Accessible or Appropriate for Developing Country Participants?</i>
Physical Price Risk Management Instruments			
Strategic timing of purchases and sales - i.e., “back-to-back” trading	<ul style="list-style-type: none"> • No up-front cost. • Negotiating flexibility into purchase/sales decisions can help minimize time between purchase or sale transactions, thus minimizing risk. 	Developing country producers may lack the negotiating power to be strategic in timing of purchases and sales.	Yes, but the need to make advances to producers generally limits an intermediary’s ability to shorten the time between purchase and sale.
Forward contracts	<ul style="list-style-type: none"> • No up-front cost. • Can be beneficial to “lock in” forward sales price, particularly if the forward price covers costs. • Can be used for pre-harvest financing. 	Buyer runs risk that producers may default if prices move higher than forward contract price and goods can be sold elsewhere at the higher market price.	Yes, but risk of default limits buyer’s interest in offering these contracts more widely.
Minimum price forward contracts	Can lock in forward sales at a minimum price, while still providing opportunity to take advantage of favorable price movements in the future.	Market cost of a price “floor” ranges from 3 - 18% of the value of the underlying price.	Yes, if forward contracting is already common. Requires education since the pricing formulas are often not well understood.
Price-to-be-fixed contracts	<ul style="list-style-type: none"> • No up-front cost. • Provides flexibility to be able to fix prices 	Can lead to speculation and disruption of physical trade flows if producers avoid fixing prices because they are	Yes, if forward contracting is already common. Requires negotiating so that producers gain flexibility to fix the

<i>Product</i>	<i>Benefits</i>	<i>Costs/Risks/Constraints</i>	<i>Accessible or Appropriate for Developing Country Participants?</i>
	when they are at a level that is favorable.	not moving in a positive direction.	price when they desire.
Long-term forward contracts with fixed or floating contracts	<ul style="list-style-type: none"> • Strengthens trade relationships. • Provides assured “home” for product. 	Fixing prices on long-term forward contracts is not necessarily advantageous because it impacts producers’ ability to take advantage of positive price movements in the future.	Yes, if forward contracting is already common. Not necessarily helpful on fixed price basis, but is more advantageous on a floating or price-to-be-fixed basis.
Financial Price Risk Management Instruments (*Generally available only for commodities with established exchanges)			
<i>Product</i>	<i>Benefits</i>	<i>Cost Risks /Constraints</i>	<i>Accessible/Appropriate for Developing Country Participants?</i>
Futures	<ul style="list-style-type: none"> • No up-front costs. • Provides ability to lock in forward prices through a financial contract. • Is useful when the ability to sell in the physical market is limited, as can happen when prices are high but the product is not in harvest or buyers are not buying. 	<ul style="list-style-type: none"> • Limits the potential to gain from positive price movements in the future. • Requires financing of a credit line or a credit guarantee. • Requires managing cash flow requirements to support (potential) daily margin calls. 	<ul style="list-style-type: none"> • Limited because of credit constraints and cash needed to manage margin requirements. • Is a higher risk instrument than option contracts because cost and risk are not limited and use of futures can create large liabilities in the form of funds owed to the market.
Options	<ul style="list-style-type: none"> • Provides ability to lock in minimum prices on the international market, while still providing opportunity to take advantage of positive price movements in the future. 	<ul style="list-style-type: none"> • Market cost of a price “floor” ranges from 3 - 18% of the value of the underlying price. 	Yes, but requires education.

<i>Product</i>	<i>Benefits</i>	<i>Costs/Risks/Constraints</i>	<i>Accessible or Appropriate for Developing Country Participants?</i>
Swaps	<ul style="list-style-type: none"> • No up-front costs. • Provides ability to manage two commodity exposures at the same time. 	<ul style="list-style-type: none"> • Requires financing of a credit line or credit guarantee. • Requires managing cash flow requirements to support (potential) daily margin calls. 	No, because rarely are trading intermediaries in developing countries exposed to two commodity prices at the same time.
Customized options	<ul style="list-style-type: none"> • Same benefits as options above. • Can be structured to more closely match specific risks. 	Same costs as options above.	Yes, but requires education.
Commodity-linked bonds or loans	<ul style="list-style-type: none"> • Could be used on macro level to manage exposure to price shocks. 	High transaction costs can be difficult to structure.	Possibly, on macro level.

Source: World Bank 2005

APPENDIX 3: SUMMARY TABLE OF ENABLING TECHNOLOGIES

<i>Technology</i>	<i>Description</i>	<i>Institutional Users/ Technology Partners</i>	<i>Agricultural Finance Business Processes</i>
Automated teller machine (ATM)	A machine that can furnish account information, accept deposits, affect balance transfers, and disburse cash.	<ul style="list-style-type: none"> ▪ Prodem (Bolivia)/Innova (Bolivia) ▪ PSHM (Albania) ▪ Opportunity International Bank of Malawi ▪ Paynet (Kenya) 	<ul style="list-style-type: none"> ▪ Produce payments ▪ Loan disbursements ▪ Savings deposits and withdrawals
Mobile branches	An ATM on a truck or a branch in a bus that goes from one village to another in rural areas that can be served infrequently (e.g., once a week). Combines ATM functionality with operational staff.	<ul style="list-style-type: none"> ▪ Equity Building Society (Kenya) ▪ Philippines 	<ul style="list-style-type: none"> ▪ Customer acquisition ▪ Product servicing, disbursements, and collections
Point-of-sale device (POS)	Small machine located at a third party merchant (such as a gas station) that can be used to authenticate the transfer of funds from the customer to the retailer or the reverse depending on the transaction type.	<ul style="list-style-type: none"> ▪ Teba Bank (South Africa) ▪ FOCCAS Uganda ▪ FINCA Uganda ▪ Uganda Microfinance Union 	<ul style="list-style-type: none"> ▪ Product servicing, disbursements, and collections

<i>Technology</i>	<i>Description</i>	<i>Institutional Users/ Technology Partners</i>	<i>Agricultural Finance Business Processes</i>
Smart cards	Wallet-sized plastic cards with embedded computer chips that can process information or simply store data.	<ul style="list-style-type: none"> ▪ FOCCAS (Uganda) ▪ FINCA Uganda ▪ Uganda Microfinance Union ▪ Opportunity International Bank of Malawi 	<ul style="list-style-type: none"> ▪ Client identification with biometrics ▪ Client and agent authentication with PINs ▪ Offline transactions, including withdrawals
Mobile phones	Permits clients to request information from, or conduct business with, an automated system.	<ul style="list-style-type: none"> ▪ Smart Communications (Philippines) ▪ Faulu/Vodafone (Tanzania, Kenya) 	<ul style="list-style-type: none"> ▪ Remittance transactions ▪ Loan servicing
Internet banking	Web-based application enables users to perform a variety of banking activities, including fund transfers, bill payments, securities trading.	<ul style="list-style-type: none"> ▪ ICICI Bank 	<ul style="list-style-type: none"> ▪ Payment transactions ▪ Client access and management of account information, 24/7 ▪ Client driven transactions, 24/7
Internet outlets	Fixed locations with a personal computer and some form of Internet access.	<ul style="list-style-type: none"> ▪ ICICI Bank, village kiosk operator ▪ ITC, e-Choupals 	<ul style="list-style-type: none"> ▪ Market information ▪ Aggregation of inputs and sales, price quotes ▪ Financial product marketing ▪ Collections of payments or deposits
Internet portals/ exchanges	Web-based applications that enable buyers, sellers, financiers, and support service providers to transact through a secure, virtual platform.	<ul style="list-style-type: none"> ▪ DMCC, Dubai Commodity Receipt 	<ul style="list-style-type: none"> ▪ Warehouse receipts, produce certification, selling, and loan financing

<i>Technology</i>	<i>Description</i>	<i>Institutional Users/ Technology Partners</i>	<i>Agricultural Finance Business Processes</i>
Biometrics technology	Measures an individual's unique physical or behavioral characteristics to recognize and confirm identity.	<ul style="list-style-type: none"> ▪ Opportunity International Bank of Malawi 	<ul style="list-style-type: none"> ▪ Client identification ▪ System security
Interactive voice response (IVR) technology	IVR technology allows callers to request information from, or conduct business with, an automated system by speaking into a telephone or inputting information through its keypad.	<ul style="list-style-type: none"> ▪ Edyficar (Peru) / Voxiva (Peru, worldwide) 	<ul style="list-style-type: none"> ▪ Client information access, and product, account, or branch information ▪ Account transaction
Personal digital assistants (PDAs)	Small, hand-held digital computers that can run specialized programs to manage MFI and client data and perform financial calculations.	<ul style="list-style-type: none"> ▪ ACCION Latin America affiliates ▪ Banco Los Andes ProCredit (Bolivia) ▪ PSHM (Albania) 	<ul style="list-style-type: none"> ▪ Customer acquisition ▪ Collections ▪ Customer retention
Scanning	Functionality that reads bar codes or other standard data formats for tracking items, ranging from pens to built-in workstation readers.	<ul style="list-style-type: none"> ▪ DMCC, Dubai Commodity Receipt 	<ul style="list-style-type: none"> ▪ Collateral management ▪ Tracking produce for payment ▪ Certification to origin ▪ Warehouse receipts

<i>Technology</i>	<i>Description</i>	<i>Institutional Users/ Technology Partners</i>	<i>Agricultural Finance Business Processes</i>
Distance learning	Online or CD-ROM-based training self-managed by the learner with participant and facilitator interactions either face-to-face or virtually, through Internet chats, discussion for a, or email.	<ul style="list-style-type: none"> ▪ Banco Los Andes ProCredit (Bolivia) ▪ FIE FFP (Bolivia) ▪ Programa Integral, ENLACE, AMC, ACCOVI (El Salvador) ▪ ITC, e-Choupals (India) 	<ul style="list-style-type: none"> ▪ Employee training ▪ Customers and farmer training
Scoring	Scoring uses information about past behavior to predict future client behavior, thereby allowing better decisions to be made today.	<ul style="list-style-type: none"> ▪ BancoSol (Bolivia), ▪ Mibanco (Peru) ▪ Banco Solidario (Ecuador) ▪ CMM Medellín, CMM Bogotá (Colombia) ▪ Unibanka (Lativa) ▪ LAPO (Nigeria) 	<ul style="list-style-type: none"> ▪ Loan origination—loan application processing and approval ▪ Product servicing—collections ▪ Customer retention—loyalty programs and incentives

Source: Frederick and Dailey 2005

REFERENCES

- Annamalai, Kuttayan, and Sachin Rao. 2003. "ITC's E-Choupal and Profitable Rural Transformation." What Works Case Study, Digital Divided Project, World Resources Institute.
- Bakhi-Dighe, Arundhati. 2004. "Virtual Choupal, Tangible Success." The Indian Express (March 19).
- Banco de Mexico. 2004. Credit Market Survey.
<http://www.banxico.org.mx/siteBanxicoINGLES/eInfoFinanciera/FSinfoFinanciera.html>.
- Bryde, Peter, and Eusebio Martin. 1999. "Grain Receipts in Economies in Transition: An Introduction to Financing Warehouse Receipts," In Agricultural Finance and Credit Infrastructure in Transition Economies: Proceedings of OECD Expert Meeting, Moscow, February 1999. Paris and Washington, DC: Organization for Economic Co-operation and Development (OECD).
- Dercon, Stefan. 2002. "Income Risk, Coping Strategies, and Safety Nets." World Bank Research Observer 17(2): 141-166.
- EBRD. "Year Round financing for Farmers in Kazakhstan,"
<http://www.ebrd.com/country/sector/agri/showcase/main.htm>.
- Frederick, Laura, and James Dailey. 2005. "The Use of Technology to Extend Agricultural Lending". Background briefing material prepared for the Commodity Risk Management Group, Agriculture and Rural Development Department of the World Bank.
- Hane Dennison, Carrie. "How index based weather insurance works," International Task Force (ITF) on Commodity Risk Management. <http://www.itf-commrisk.org/itf.asp?page=50?>.
- Ibarra Pando, Hector. 2003. "Adminstracion de Riesgos Naturales en Mexico: Un Caso Practico en el Diseno de un Derivado Climatico para la Agricultura." (Thesis, ITAM).
- Ibarra Pando, Hector, and Olivier Mahul. 2005. "The Role of Self-Insurance Funds in Providing Credit: The Case of the Fondos in Mexico". Background briefing material prepared for the Commodity Risk Management Group, Agriculture and Rural Development Department of the World Bank.
- Indian Tobacco Company website. "ITC Profile", www.itcportal.com.
- Klapper, Leora. 2005. "The Role of "Reverse Factoring" in Supplier Financing of Small and Medium Sized Enterprises." Background paper prepared by the Development Research Group for Rural Finance Innovations. Washington, DC: World Bank.
- Langenbucher, Anja,. 2005. "Warehouse receipt financing and related collateralized lending mechanisms". Background briefing material prepared for the Commodity Risk Management Group, Agriculture and Rural Development Department of the World Bank.
- Nkini, Goodluck. 2005. "Trade Finance." Presentation to Borrowers at CRDB Bank Coffee Workshop, Moshi, Tanzania, March.
- Prystay, Cris.2003. "How to Profit from the Poor." Far Eastern Economic Review June 5, 2003.
- Rao, V. Chandar. 2003. "Case Study on BASIX Mobile Computing Solution." Basix.
<http://www.basixindia.com/itsl.asp>
- Ross, Jeanne W., and Peter Weill. 2002. "Six IT Decisions Your IT People Shouldn't Make." Harvard Business Review November 2002.
- Russo, Eillen M. 1996. "The Change Leadership Journey." HRDQ, 1996.

- Skees, Jerry, Panos Varangis, Donald Larson, and Paul Siegel. 2002. "Can Financial Markets Be Tapped to Help Poor People Cope with Weather Risks?" Policy Research Working Paper 2812. World Bank, Washington, DC.
- Swiss Re. 2004. Insurance Industry on the Road to Recovery No. 3/2004. Swiss Re.
- Tschirley, David, Ballard Zulu, and James Shaffer. 2004. "Cotton in Zambia: An Assessment of Its Organization, Performance, Current Policy Initiatives, and Challenges for the Future." Working Paper No. 10. Food Security Research Project, Lusaka, Zambia.
- UNCTAD (United Nations Conference on Trade and Development). 1996. "Collateralized Commodity Financing, with Special Reference to the Use of Warehouse Receipts." UNCTAD/COM/ 84, July 2.
- UNCTAD (United Nations Conference on Trade and Development).2001. "Potential Applications of Structured Commodity Financing Techniques for Banks in Developing Countries.", Study prepared by the UNCTAD Secretariat, UNCTAD/ITCD/COM/31.
- Upton, David M. and Virginia A. Fuller.2003. "The ITC eChoupal Initiative," Harvard Business School Case, October 28.
- World Bank. 2005. "The Financing of Maize Production and Price Risks in Uganda and Tanzania: AFT Private Sector." Economic Sector Work (ESW), World Bank, Washington, DC.
- WRI (World Resources Insitute). "Quick Look' at ITC Ltd.'s E-Choupals: Backward Integration As a Forward-Looking Strategy for India's Rural Markets." http://www.digitaldividend.org/pubs/pubs_01_echoupal.htm.
- Zeller, Manfred.2003. "Models of Rural Finance Institutions." Paving the Way Forward for Rural Finance: An International Conference on Best Practices, June 2003. [http://www.basis.wisc.edu/rfc/documents/slides/theme_models_slides.pdf#search='Manfred%20Zeller'\]](http://www.basis.wisc.edu/rfc/documents/slides/theme_models_slides.pdf#search='Manfred%20Zeller'])

Notes

1. For example, CRMG advice on the weather insurance pilot described in the BASIX case study led to replication effects by other insurance companies that insured around 18,000 farmers in the following year.
2. In jurisdictions where there are not two parts of a receipt, certificate of pledge and certificate of title, but only one, the lender receives the single-part warehouse receipt and releases it—once he has been reimbursed—to the off-taker, who in return uses it to release the commodities from the warehouse.
3. IFC export receivables program, for structure see for example Molinos Rio de la Plata IFC/R 2003-0002.
4. An indemnity fund is usually created by collecting contributions from all participating warehouses who charge a fee to their customers. If a new warehouse receipt system is being set up, a fund can also be established through government contributions. Utilizing government funds to create an indemnity fund could be desirable in those cases where a serious commitment from government to set up such a system could break down barriers to entry for other private participants.
5. Investors prefer local reference prices in order to minimize basis risk. The Brazilian futures market—BM&F (Bolsa de Mercadorias & Futuros)—offers liquid coffee and cattle futures.
6. Tracking the total number of operations by value of CPR contracts, the value from US\$3,000 to US\$10,000 is found to be most commonly used, which is typically a sufficient fund to finance medium-size producers.
7. Besides the sale of produce to exporters directly, depending on the price DrumNet sells to the Nairobi's central Wakulima market, Nairobi's Export Processing Zone near JKIA, and Karatina's central produce market.
8. Recall that these credit funds were not disbursed directly to member farmers as cash, but were used to reimburse local agrosupply vendors that had distributed seeds and fertilizers to our farmers.
9. During the months of June, July, and August of 2004, the DrumNet office in Kerugoya had 500 transacting members and was able to generate revenues sufficient to match two-thirds of the costs associated with that business unit. Thus, the assumption that a DrumNet office, actively serving 1,000 farmers, could generate fee and commission income sufficient to cover local costs seems to be confirmed.
10. Assuming yields of 600 kilograms per hectare and an exchange rate of 4,700 Zk/US\$.
11. Information on risk-pooling concepts was drawn from Ibarra and Mahul 2005.
12. Appendix 1 describes financial and physical risk-management instruments.
13. See mini case study following technology topic paper on BASIX's "Portfolio Manager."
14. BASIX comprises five companies: 1) Bhartiya Samruddhi Investments and Consulting Services, Ltd., a holding company, 2) Bhartiya Samruddhi Finance Ltd., a nonbank financial company, 3) Krishna Bhima Samruddhi Local Area Bank Ltd., a nonbank financial company, 4) Indian Grameen Services, a not-for-profit company, and 5) Sarvodaya Nano Finance Ltd., a nonbank financial company owned by women's SHGs.
15. The percentage of premium subsidy given by the federal government has been changing over time. It was 20 percent only for the insurance provided by Agroasemex, the national agricultural insurer, in 1991. It increased to 30 percent and Fondos were incorporated as beneficiaries of the subsidy in 1992. It remained at 30 percent but included the private companies from 1994 to 2000. Since 2001, the percentage ranged from 25 to 45 percent depending on the crop and the region.
16. It is important to consider the fact that the costs born by the government during the 1990s included the set-up cost and training of self-insurance funds. No information was available to quantify these expenses.

17. In Mexico there are two agricultural production cycles: the Spring–Summer (SS) cycle, which is mainly rainfed and runs approximately from April to October and the Autumn–Winter (AW) cycle, which is mainly irrigated and runs from November to May of the next year. Consolidated results involve the sum of the numbers from both cycles. AW results are accounted in the same year when the cycle has begun (example, AW beginning in 1991 is included in 1991 consolidated numbers).

18. Combined Ratio = (total indemnities – reinsurance indemnities + administrative expenses + reinsurance cost) / total premiums.

19. Reinsurance Loss Ratio = total indemnities paid by reinsurer / total premium charged by the reinsurer for the unlimited stop loss offered to the Fondos.

20. For a detailed description of enabling technologies, refer to Appendix 2.

21. www.itcportal.com.

22. This case study does not have a background paper associated with it. For more information, please see the ITC website: www.itcportal.com. This case study is based on a July 2004 visit to ITC that included meetings with S. Sivakumar, Chief Executive, Agri Business, and his senior management team. The author is grateful to ITC for their collaboration and guidance; any errors remain the fault of the author.

23. For more detailed information on BASIX’s risk management activities, please see the Case Study on BASIX in the Risk Management section of the paper.

24. A portable personal computer whose size enables it to be held in one hand while it is operated with the other hand.