Enhancing Microfinance Using Index-based Risk-Transfer Products

Jerry R. Skees and Barry J. Barnett*

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Contact Author:

Jerry R. Skees
Department of Agricultural Economics
Room 310 CEB
University of Kentucky
Lexington KY 40546
jskees@uky.edu
Phone 859 257 7262
Fax 859 257 7290

***Jerry R. Skees is H.B. Price Professor, Department of Agricultural Economics, University of Kentucky and president of GlobalAgRisk, Inc; Barry J. Barnett is associate professor, Department of Agricultural and Applied Economics, University of Georgia.** The case studies and many of the ideas presented in this article originate from the authors' development work in India, Mongolia, and Peru. Support from the World Bank (India and Mongolia) and USAID (Peru) is gratefully acknowledged.

ABSTRACT

Enhancing Microfinance Using Index-based Risk-Transfer Products

While significant progress in microcredit and microfinance has been made in low-income countries, lending for small farming enterprises has been limited. This article reviews how innovative Index-based Risk-Transfer Products (IBRTPs) can be used to transfer the correlated natural disaster risks that often hamper the development of farm-level microcredit. By linking lending to IBRTPs, access to microcredit can be enhanced while also providing opportunities to offer mutual sharing of the basis risk that remains after correlated risks are transferred into global markets. This opens the way for new thinking about developing agricultural insurance in low-income countries.

Keywords:

Index-based Risk Transfer; Microfinance; Microcredit; Microinsurance; Disaster Risk Management / Mitigation; Agricultural Poverty; Agricultural Insurance; Agricultural Finance; Rural Credit Markets.

Enhancing Microfinance Using Index-based Risk-Transfer Products

The microfinance movement is largely motivated by a desire to expand financial services to small households in low-income countries. An extensive literature exists on mechanisms for making unsecured microloans (e.g., Kritikos and Vigenina, 2005) that emphasizes joint liability within cooperative savings and lending groups, as well as dynamic incentives for increasing loans based on previous payback performance. However, there is very little literature on how access to microfinance can be enhanced using "collateral-like" contingent claims. This article is targeted at filling that gap by addressing how innovative Index-based Risk-Transfer Products (IBRTPs) can be used to transfer the correlated natural disaster risk that often exists in microfinance loan portfolios.

Although the primary focus of this article is on microcredit and microfinance, the ideas presented can be extended to any financial entity that lends in a small market and is exposed to one or more clearly identified natural hazards. When a large percentage of borrowers are exposed to correlated natural hazards that either destroy household assets or severely reduce cash flow, loan defaults can spike following a natural disaster. This has important implications for the availability of microcredit, the sustainability of small-scale lenders, and the terms of credit offered to borrowers. While microfinance exists in both rural and urban settings, the primary focus here is on expanding financial services for rural households in low-income countries. This emphasis is consistent with the United Nations Millennium Development Goals (MDGs).[1]

> About 70 percent of the MDGs' target group lives in rural areas, particularly in Asia and Africa, and for most of the rural poor, agriculture is a critical component in the successful attainment of the MDGs (Rosegrant, et al., 2005, p. 10).

A growing literature in development economics describes how households in low-income countries can be trapped in chronic poverty. The next section of this article briefly summarizes that literature with a particular focus on how limited availability of financial services contributes to the existence of poverty traps. More generally, it is often argued that increased access to financial services — savings, lending, and insurance — can enhance risk-taking behavior, technological adoption, and

[1] See http://www.un.org/millenniumgoals/

economic growth among the rural poor. Thus, it may be possible to justify, both on the basis of economic growth and equity, some forms of government support for the provision of financial services to the rural poor. However, to develop sustainable rural financial systems, the specific mechanisms used to provide such support must be carefully considered.

The article next turns to the economics of providing financial services to poor households that have limited collateral. This discussion is motivated primarily by insights from the literature on transaction costs economics and information economics. These insights help explain the growth of microcredit and microfinance in many low-income countries — which is the focus of the third section of the article.

The fourth section describes how, for poor households exposed to natural disaster risk, IBRTPs can be used to enhance access to savings and credit. The success of these efforts is conditioned on finding unique ways to link IBRTPs to small-scale lending. In the fifth section of the article, case studies from India, Mongolia, and Peru demonstrate current attempts to build such links. The sixth section, motivated by current efforts in Peru, describes how the linkages between IBRTPs and small-scale lending could evolve over time through a sequence of stages. The seventh section of the article briefly describes some promising technologies that could further enhance the availability of relatively low-cost–loan-linked insurance products in rural areas of low-income countries. The last section contains concluding comments.

Natural Disasters and Poverty

Because the returns from agriculture (and other economic endeavors) are stochastic, many households in rural areas of low-income countries can experience poverty on a transitory basis. Chronic poverty, on the other hand, occurs when the *expected* return from a household’s productive assets is less than some defined income measure of poverty. Thus, an important policy question is whether households can accumulate sufficient assets to grow out of chronic poverty. Households can become trapped in chronic poverty when their assets’ expected growth trajectories contain multiple dynamic equilibria — that is, when segments of the trajectory are characterized by locally increasing marginal returns on assets

(Barrett, et al., 2006; Barrett and Swallow, 2006; Carter and Barrett, 2006). This may occur for a number of reasons. Input prices, output prices, or transaction costs may be related to scale over certain levels of assets. A more common cause is that barriers to entry, in the form of large required investments, exist for economic enterprises that promise higher returns (Barrett, et al., 2006; Dercon 1998; Dercon and Krishnan, 1996; Banerjee and Newman, 1993). Even with such barriers to entry, it is possible that households can grow out of poverty through autarchic savings and accumulation. However, for poor households, the opportunity cost of savings, in the form of foregone consumption, can be quite high[2].

Rural households in low-income countries are often susceptible to extreme events that contribute both directly and indirectly to the existence of chronic poverty. Productive assets (such as livestock) that have been acquired at high opportunity cost can be destroyed by natural disasters (Carter, et al., 2005; McPeak and Barrett, 2001; Dercon 1998) or liquidated to smooth consumption following a shock (Zimmerman and Carter, 2003; Dercon, 1996; Rosenzweig and Wolpin, 1993).

But the risk of such shocks also contributes indirectly to chronic poverty. Households that live near subsistence levels may become extremely risk averse. For example, they may adopt low-return economic enterprises rather than take on the additional risk required to engage in enterprises that promise higher returns. This is particularly true if the higher return enterprise requires an investment in highly illiquid assets (Moser and Barrett, 2003; Zimmerman and Carter, 2003; Carter and May, 1999; Dercon 1998; Eswaran and Kotwal, 1990, 1989). For these reasons, risk exposure can contribute to low-income households becoming trapped in chronic poverty.

Access to financial markets (insurance, savings, and lending) can help alleviate some of the conditions that tend to trap households in chronic poverty. Insurance allows households to make *ex ante* investments in instruments that protect income streams against well-defined negative shocks. Borrowing allows households to acquire the assets required for economic enterprises that promise higher returns. Savings and borrowing can be used to smooth consumption over time, thus reducing the need to liquidate

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[2] For a broader discussion regarding how the poor manage and cope with various types of risks, please see Siegel (2003).

productive assets following negative shocks. However, in rural areas of many low-income countries, access to financial markets is extremely limited.

Economic Constraints for Providing Financial Services to the Poor

Insurance that protects against asset losses or agricultural production shortfalls is generally not available in low-income countries due to asymmetric information, high transaction costs, and high exposure to correlated risk. Agricultural insurance is highly susceptible to the asymmetric information problems of moral hazard and adverse selection (Just, Calvin, and Quiggin, 1999; Coble, et al., 1997; Smith and Goodwin, 1996; Quiggin, Karagiannis, and Stanton, 1994; Chambers, 1989; Skees and Reed, 1986). Asymmetric information contributes to high transaction costs associated with underwriting, monitoring, and loss adjustment. Most of these costs do not vary significantly with the amount of insurance protection purchased; thus, for relatively small policies the transaction costs of insurance protection per currency unit are extremely high. Insurance delivery costs can also be quite high in rural areas. Again, this is particularly true when measured relative to the small amount of insurance protection per policy.

The very same asymmetric information and transaction costs problems also plague financial markets in rural areas of low-income countries, contributing to high market interest rates. Market interest rates are also affected by default risk. Ray (1998, pp. 544–545) provides a simple model of how default risk is loaded into interest rates. Assume that a lender's expected profit π is calculated as

$$(1)\quad \pi = p(1+i)L - (1+r)L$$

where p is an exogenous probability of non-default (1 - p is the probability of default) that is constant across all loans, i is an interest rate charged to borrowers, r is the lender's opportunity cost of funds used for loans, and L is the amount of funds loaned. In a perfectly competitive market, profits would equal zero in equilibrium, thus

$$(2)\quad i = \frac{1+r}{p} - 1 \ .$$

A relatively simple example demonstrates how sensitive market interest rates are to default rates. Assume that the opportunity cost of funds r is 10%. If the probability of default is zero (p = 1.00), the market interest rate is also 10%. If the probability of default is 0.10 (p = 0.90), the market interest rate would more than double to 22%.

Exposure to spatially correlated risks (e.g., drought) further limits the availability of both financial and insurance services in low-income countries (Hoff and Stiglitz, 1990; Rosenzweig, 1988; Binswanger and Rosenzweig, 1986; Braverman and Guasch, 1986). When the losses experienced by borrowers are highly correlated, loan defaults are also likely to be highly correlated. Lending institutions attempt to reduce aggregate risk exposure by pooling loans. However, if the loans that make up the portfolio are susceptible to correlated shocks, the lender will be vulnerable to catastrophic losses. Unless this exposure to correlated shocks can be transferred out of the portfolio, a prudent lender will limit the amount of loans provided in a given area. The same logic holds for insurers. In this way, correlated risk exposure further contributes to the limited availability of formal financial and insurance services in rural areas of low-income countries. If these services are available, the costs are likely to be prohibitively high for most low-income households.

Consider an extension of the simple algebra presented in Equation (2). Assume that while the normal probability of default is 10% as presented above, every 1 in 10 years there is a correlated natural disaster that causes a 50% default rate. The average default rate is then 14%, which, given a 10% opportunity cost of funds, implies a market interest rate of 28%. However, a risk-averse lender will likely also add an additional interest rate load to account for the extreme default risk — in the same manner that a reinsurer loads reinsurance premium rates for the risk of extreme correlated loss events. In the case of reinsurance, it is not uncommon to see premium rate loads calculated by doubling the expected magnitude of loss for the extreme event. Applying this “rule of thumb” to this example, the lender would charge an interest rate that reflects a 100% default rate when the correlated natural disaster occurs. This generates an average default rate of 19% which translates into a loaded interest rate of 36%. More likely, a small geographically-bound rural lender would simply chose not to offer loans under these conditions. Finally, note that these numerical examples are based on the unrealistic assumption of a perfectly competitive loan market. To the extent that loan markets are less than perfectly competitive, this would cause market interest rates to be even higher relative to the opportunity cost of funds.

Market failures associated with asymmetric information, high transaction costs (including delivery costs), and correlated risk exposure are sometimes used to justify government intervention in financial or insurance markets for rural areas. However, such interventions should be carefully considered. Much has been written about the unintended consequences of providing direct subsidies tied to either loans or insurance products (Gonzalez-Vega, 2003; Morduch, 1999; Skees and Barnett, 1999). A more promising form of intervention is described by Gonzalez-Vega:

> Spontaneous rural financial deepening does not proceed at the socially desired speed. Many market transactions are missing because the environment is not conducive to their emergence or because the required infrastructure is not available. Development of a more complete physical and institutional infrastructure is needed for the emergence and operation of formal rural financial markets. As most of this infrastructure consists of public goods, the central role of the state is to provide these goods. This type of state action is very different from the interventions that characterized earlier strategies of subsidized agricultural credit (Gonzalez-Vega, 2003, p. 26).

The regulatory environment is an important part of the institutional infrastructure described by Gonzalez-Vega. Financial regulations can protect the interests of consumers by reducing information asymmetries. However, regulations that are not sufficiently flexible to accommodate financial innovations can greatly increase the transaction costs of providing financial services to the poor.

Progress in Microcredit and Microfinance

In recent years, microfinance institutions (MFIs) have emerged as an increasingly important source of savings and lending in rural areas of many low-income countries. In the 1970s, experimental programs in Bangladesh, Brazil, and parts of Africa illustrate that groups of poor women could act collectively to make loans for microenterprises. Through the 1980s and 1990s, the Grameen Bank microfinance model in Bangladesh was extended into many other parts of the world. While many early microfinance efforts were donor funded, MFIs are now building linkages with commercial interests (e.g., BASIX of India and their links to ICICI Bank). While progress has been made in lending for microenterprises in many countries, it is not uncommon to see reviews concluding that:

> The microfinance (MF) sector has developed rapidly in developing countries over the last two decades, making credit available for many poor microentrepeneurs, although in most cases it has practically skipped the rural poor and most particularly their agricultural activities as smallholders (Valdivia and Bauchet, 2003, p. iv).

The primary defining characteristic of MFIs is that they are organized as member-owned cooperatives, or mutuals. However, MFIs can vary from small cooperative savings and lending associations to relatively large organizations much like the so-called "credit unions" in the United States. With regard to their lending activities, MFIs generally have the following characteristics: 1) loans are made only to members of the MFI; 2) loans are relatively small and generally unsecured; 3) all assets and liabilities of the MFI are owned jointly by the members; and, 4) internal monitoring and social sanctions are often used to enforce MFI loan contracts.

MFIs are able to address several of the problems that tend to keep formal lenders from locating in rural areas of low-income countries. The cooperative nature of MFIs greatly reduces asymmetric information problems. Since all assets and liabilities are jointly owned, members have an economic incentive to monitor how loan proceeds are being invested. To the extent that MFIs can enforce loan contracts through internal monitoring and social sanctions, they avoid the high transaction costs associated with using the legal system.

Unlike larger lenders, it is very difficult for MFIs to diversify spatially. This leaves MFIs highly vulnerable to correlated risk exposure from events such as natural disasters. In the wake of a major natural disaster, many (or perhaps even all) borrowers may default on their loans. Recognizing this vulnerability, MFIs may attempt to build financial reserves in the years when natural disasters do not occur. But in a credit-constrained environment, the opportunity cost of building reserves (by providing fewer loans than would otherwise be provided) is quite high. Moreover, due to the magnitude and correlated nature of the risk, very large reserves will be required to assure the long-term sustainability of the MFI. It is also possible that a natural disaster could occur before sufficient financial reserves have been accumulated. Thus, natural disasters can be a major constraint to the emergence of MFI activity in some areas.

When MFIs attempt to ensure long-term sustainability by building and maintaining adequate reserves, they are effectively attempting to insure their borrowers (up to the value of their loans) against the financial consequences of natural disasters. Given the high opportunity cost of building and maintaining financial reserves, many MFIs would be interested in mechanisms for transferring at least part of their natural disaster risk exposure to other parties.

Index-Based Risk-Transfer Products (IBRTPs)

Index-based Risk-Transfer Products (IBRTPs) are a class of financial instruments designed to transfer correlated risks between parties. IBRTPs can be structured as options, bonds, derivatives, or insurance products. The legal and regulatory environment of the host country will be a major determining factor in how an IBRTP is structured. Thus far, the major pilot programs that have been implemented have classified IBRTPs as insurance products. Regardless, the characteristic feature of IBRTPs is that the payout on the instrument depends on realized values of a specifically designed measure, or index, correlated with the risk of concern (Skees and Barnett, 1999). Unlike traditional insurance that makes payouts based on the actual loss incurred, IBRTPs make payouts based on the realized value of an index that is correlated with actual losses.

IBRTPs are increasingly being used in developed countries. Examples include area-based yield and revenue insurance products such as the Group Risk Plan (GRP) and Group Risk Income Protection (GRIP), which are agricultural insurance products offered through the U. S. Federal Crop Insurance Program (Barnett, et al., 2005; Vercammen, 2000; Mahul, 1999; Wang, et al., 1998; Skees, Black, and Barnett, 1997, Miranda, 1991); catastrophe bonds and options used by property and casualty insurers (Bantwal and Kunreuther, 2000; Hommel, 2000; Croson and Kunreuther, 1999; George, 1999; Lewis and Davis, 1998; Jaffee and Russell, 1997); and weather derivatives used primarily by firms in the energy sector (Alaton, Djehiche, and Stillberger, 2002; Müller and Grandi, 2000; Zeng, 2000).

Agricultural applications of IBRTPs have generally been limited to area-based yield and revenue insurance products, though some studies have examined the potential for using other types of IBRTPs in agriculture (Vedenov, Epperson, and Barnett, forthcoming; Vedenov and Barnett, 2004; Mahul, 2001; Martin, Barnett, and Coble, 2001; Miranda and Vedenov, 2001; Turvey, 2001a,b). Since low-income countries typically do not have the data systems necessary to develop and maintain area-based yield and revenue IBRTPs, several recent studies have examined the potential for using weather IBRTPs as a means to transfer the correlated risk inherent in agricultural sectors of low-income countries (Skees, Barnett, and Hartell, 2005; Hess, et al., 2005; Skees, 2003; Varangis, Skees, and Barnett, 2002; Skees 2000). The World Bank has recently supported IBRTP projects in countries such as Morocco (Skees, et al., 2001), India (Hess, 2003), Malawi (Hess and Syroka, 2005), and Mongolia (Mahul and Skees, 2006).

IBRTP payoffs are based on a widely available and objectively measured index, such as the cumulative rainfall measured at an official weather station over a specified period of time. This eliminates the potential for adverse selection. Those who purchase IBRTPs cannot affect the realized values of the index so there are also no moral hazard problems. IBRTPs also have relatively low transaction costs because there is no need for monitoring or loss adjusting. In the United States, standardized temperature-based IBRTPs for a few major cities are traded in exchange markets. These instruments are targeted to the energy sector. However, most weather-based IBRTPs are customized to the needs of the end user and sold by reinsurers.

IBRTPs are subject to basis risk. It is possible for a purchaser to experience a loss and yet, not receive a payment. Conversely, it is possible for a purchaser to receive a payment without actually experiencing a loss. The higher the correlation between the underlying index and the loss incurred, the lower the basis risk. Thus, basing an IBRTP on a carefully constructed index can reduce (though not eliminate) a purchaser's exposure to basis risk.

Linking IBRTPs with Microcredit and Microfinance: Case Studies

In rural areas of low-income countries, many households are trapped in chronic poverty due, in part, to a lack of adequate financial services, which are limited, in part, by correlated risk exposure.

Current efforts to introduce IBRTPs into low-income countries are motivated by a belief that the availability of such mechanisms for transferring correlated risk exposure should reduce the financial market limitations that contribute to chronic poverty.

Recent efforts to introduce IBRTPs into low-income countries have faced two challenges. The first is finding low-cost mechanisms for delivering the benefits of IBRTPs to small farmers in rural areas. The second is attempting to address the basis risk inherent in IBRTPs. An ongoing World Bank project in Malawi is addressing the first challenge by linking IBRTPs to production loans provided by input suppliers. Another alternative would be to link IBRTPs to loans made by rural financial institutions that are providing microcredit to households. If the benefits of IBRTPs can be passed to small holders via the lending process, it could be significantly less costly than attempting to sell small holders any form of farm-level agricultural insurance. As developed below, if IBRTPs are linked to loans, it may also be possible to reduce some of the basis risk exposure.

There are numerous ways to link IBRTPs to lending. In India, the MFI, BASIX, is both retailing rainfall insurance (a form of an IBRTP) and using an aggregate rainfall risk-transfer product to protect against default risk. In Mongolia, a new project that offers index-based insurance to livestock herders is working to link these contracts into the borrowing activities of small herders. In Peru, a USAID supported effort is underway to transfer the risk of El Niño-related catastrophic flooding by working with MFIs to develop a new process for passing indemnity payments from the IBRTP to small borrowers who experience crop losses[3].

India: Rainfall Insurance to Protect Against Loan Default Risk

Since 2003, the insurance group ICICI-Lombard of Mumbai has been developing rainfall insurance products. Their model has been to use MFIs in India as the delivery mechanism to reach small farmers. ICICI-Lombard has expanded its efforts to a number of areas around the country. One of the first MFIs to be involved was BASIX of Hyderabad in the state of Andhra Pradesh. The BASIX group delivers a host of services — savings, lending, technical expertise, insurance, etc. Previous experience

[3] The authors are involved in the development of this ENSO insurance effort.

indicated that when major droughts occurred during the *khariff* (the prime growing season, from June to September), there was a significant increase in loan defaults. In 2004, BASIX began purchasing a basket of rainfall insurance contracts from ICICI Bank to transfer this loan default risk. Previously, these rainfall IBRTPs have been tied to insufficient rainfall during a period that impacted ground nut and castor production. For 2006, BASIX is also purchasing excess rainfall contracts (with no reference to specific crops) since flooding is also highly correlated with increased loan defaults among borrowers.

Mongolia: Index-Based Livestock Insurance

Nearly one-third of Mongolia's gross domestic product is tied to livestock herding. From 2000–2002, roughly one-third of the livestock in Mongolia died due to *dzud* (the phenomenon created by extreme conditions of a hot summer, e,g,, major droughts, followed by a harsh winter). The government of Mongolia requested assistance for this problem from the World Bank. Skees and Enkh-Amgalan (2002) recommended creating a mortality index by species and *soum* (county) to transfer the correlated risk of livestock deaths. In the spring of 2005, the government of Mongolia negotiated a unique loan to fund a pilot test of an IBRTP, known as Index-Based Livestock Insurance (IBLI), in three *aimags* (states) over 3 sales years.

The IBLI is based on government estimates of mortality within the soum. When mortality rates of adult animals exceed 7 percent, herders begin to receive payments based on the average mortality rate for the soum. The risk exposure is layered so that insurance companies pay for losses between 7 and 30 percent. The government pays for extreme losses beyond 30 percent. Payments occur with no need to count the herder's actual death loss — a nearly impossible task in the vast regions of Mongolia.

The IBLI project is also tied to an existing project on sustainable livelihoods. That project includes financing to support microcredit and microfinance. There is an ongoing effort to make strong links between these two projects. In 2002, the last year of a major dzud in Mongolia, there were less than 10,000 outstanding loans to herders. The 2002 dzud caused the deaths of around 3 million adult animals (12 percent of the total). In some areas, herders lost entire herds of animals. Microloans to herders in

Mongolia have increased significantly in recent years. Now roughly 50,000 herder families have loans at some level. Thus, when another major dzud occurs, loan defaults will almost certainly increase.

In Mongolia, lenders and insurers are currently considering how they should link the IBLI product to lending. Such linkages should reduce default risk associated with dzud. Also, when herders purchase the IBLI product with their loans, the cost of delivery should be less than with the current agent-based system for selling IBLI products. Thus, the loan-linked IBLI should result in lower premiums paid for the IBLI and lower interest rates. The contract would allow the lender to have first claim on IBLI payments to pay off herder loans following a major dzud. The mechanisms for doing this are largely in place since herders' banking information is collected when the IBLI products are sold.

Herders tend to pay off loans quickly and may take out several loans during the insurance cycle of the IBLI. Therefore, the IBLI product can serve as a rolling form of "collateral." Herders take out loans for a variety of purposes but primarily to smooth cash flow. The IBLI contract will span at least one year from the time of sale until potential indemnity payments are received. Banks in Mongolia have expressed an interest in linking IBLI insurance with lending as described above. One bank is already posting two interest rates for the first year of IBLI sales even through they do not yet have the strong linkages outlined above. Herders with IBLI products will receive an interest rate that is 1 percent per year lower than those without the insurance.

Peru: El Niño-based Indexes

Along the entire coast of Peru (and particularly in its northern regions), El Niño events can create tremendous flooding. When sea surface temperatures rise in the central equatorial Pacific, the warm air movements coming off the ocean collide with the cold air masses from the Atlantic as they cascade down the Andes Mountains into the foothills. The massive front causes extreme rainfall that creates extensive flooding as the rainwater runs down from the lower highlands towards the sea.

During the 1997–1998 El Niño, parts of northern Peru had in excess of 1,000 mm of rain during the critical growing season of January–April. Households lost not only their annual crop production but also assets such as terraced fields and buildings. Loan defaults were widespread both because of actual losses and because the government intervened and allowed farmers to default on loans. Had the MFIs had effective risk protection, they may have mitigated the government intervention to some extent. Recent interviews with MFI managers in the region indicate that many of them have since ceased making agricultural production loans.

A project funded by the U.S. Agency for International Development (USAID) is attempting to improve access to credit for Peruvian farmers who are subjected to these catastrophic risks from El Niño events. Agricultural insurance could fill the void. Peru had experience with traditional indemnity-based agricultural insurance during the mid-1990s. While this insurance product was being introduced, the 1997–1998 El Niño created massive crop failures. This immediately halted any further interest in agricultural insurance. The current USAID project in Peru has turned around completely the traditional agricultural insurance development process. Rather than starting with an indemnity-based insurance product for individual farmers, the project is attempting to use rural financial markets to deliver the benefits of IBRTPs to small farmers.

Unpublished work conducted by Miranda, et al. (2006) shows that the El Niño Southern Oscillation (ENSO) 1+2 index, which measures sea-surface temperatures off the coast of northern Peru, is an excellent predictor of excess rainfall in this region of Peru. A major reinsurer has expressed willingness to write an ENSO-based IBRTP. ENSO measures are a good underlying index for an IBRTP because they are independently determined. In addition, there are nearly 150 years of historical ENSO data. MFIs have expressed their interest in purchasing such IBRTPs to transfer their portfolio risks associated with major flooding.

Sequential Development of IBRTP-Linked Lending

A model currently being discussed for Peru suggests a general process for developing IBRTP-linked lending. The model consists of four sequential stages of development.

1. IBRTPs provided to MFIs by global reinsurance markets to offset the natural disaster-linked default risk in the MFIs' portfolios.

2. MFIs as a conduit for borrowers to purchase IBRTP protection that is proportional to their loan values. No attempt is made to assess the actual loss incurred by each borrower.
3. Linkages to individual loans whereby proceeds from an IBRTP are used to make indemnity payments to farmer-borrowers based on the extent of the actual loss experienced.
4. Local insurance companies use IBRTPs as reinsurance and underwrite individual farm-level crop insurance policies that are linked to MFI loans. The MFI serves simply as a low-cost insurance delivery mechanism.

The model is sufficiently flexible to be adapted to various market and regulatory institutions existing within different countries. In general, as one moves through the sequential stages, the borrower’s exposure to basis risk on the IBRTP is reduced but transaction costs are increased. How far a MFI would (or could) proceed through these sequential steps is highly dependent on the regulatory structure within the country, the basis risk associated with the underlying IBRTP product, the availability of insurance partners, and the transaction costs of conducting farm-level underwriting, rating, and loss adjusting.

In Stage 1, an MFI would purchase an IBRTP using proceeds from an interest rate load. Any indemnity payment from the IBRTP would then be used to offset the cost of default risk associated with a major natural disaster. In areas that have significant exposure to natural disaster risk, MFIs are likely already loading interest rates for default risk. By purchasing the IBRTP, the MFI could reduce the load for default risk thereby reducing the net additional cost of purchasing the IBRTP to borrowers. The MFI would use the proceeds from the IBRTP to compensate for losses that the entire entity suffers without a direct tie to individual loans. In this case, the key issue is the cost of capital for the MFI during a major crisis versus the cost of capital for the IBRTP. When a common disaster is impacting most of the MFI customers a significant liquidity problem is likely to emerge. On the one side, depositors are more likely to be withdrawing their savings due to the disaster and on the other side, defaults are likely increasing and the MFI is more likely to need reserves or provisions to compensate for these defaults.

Stage 2 would involve simply distributing the IBRTP payments to every borrower on a pro-rata basis with no effort to conduct individual loss adjusting. This stage is very similar to what is currently done with loan-linked area-yield insurance products in India. The MFI is simply a conduit for borrowers to purchase IBRTP protection that is proportional to their loan value. Stages 1 and 2 address the challenge of getting IBRTP benefits to small farmers but do not address the problem of basis risk.

Stages 3 and 4 extend these ideas in an attempt to address basis risk. Stage 3 would use the IBRTP payments to pay down some portion of the loans of only farmer-borrowers *who suffer losses* caused by the natural disaster that triggered the IBRTP payment. The maximum indemnity would equal the amount of the loan. It is a standard international regulatory practice to preclude banks and other financial institutions from acting as insurers. In the proposed arrangement, the lender is not exposed to financial risk for the IBRTP component as the only payments for those losses would come from the global reinsurer. Furthermore, the arrangement being proposed in Stage 3 should not be classified as insurance since the payments are not directly equivalent to farm-level losses. The MFI assumes no liability for losses that exceed the proceeds received from the IBRTP and there is no guarantee that the proceeds received from the IBRTP will be sufficient to pay for all farm-level losses. Thus the loan-linked product in Stage 3 would be better classified as a quasi-formal financial service offered by the MFI.

To reduce the loss adjustment cost, the arrangement would begin with a self-declaration of losses with some guidelines and local monitoring provided by the MFI. Borrowers could also opt to pay off the loans should they have the cash flow. Those paying off loans during an extreme event would be rewarded with more favorable terms of credit in the future. Once all losses were determined, borrowers' individual payments would be based on the aggregate loss assessment and the total amount of funds received from the IBRTP. If the IBRTP payment exceeds the aggregate loss assessment, the excess could be applied to a reserve that will help cover losses for future disasters. If the IBRTP payment is less than the aggregate loss assessment, individual payments would be calculated on a pro-rata basis. There would be a natural tension in the system because the pro-rata distribution creates a zero-sum game. Each borrower would have an incentive to make certain that other borrowers are honest in their self-declaration of losses since any payment made to one borrower reduces the amount available for other borrowers. With experience, MFIs could modify the specific rules and arrangements for how losses are calculated and IBRTP payments are distributed. As a further extension, MFIs could build reserves to supplement IBRTP payments.

Transaction costs are higher in Stage 3 because individual losses must be assessed whenever an IBRTP payment is received by the MFI. Of course, it is this same feature that reduces the basis risk on the IBRTP payment. Rather than simply allocating the IBRTP payment in proportion to the size of each loan (as in Stage 2), Stage 3 attempts to limit indemnities only to those who actually experienced natural disaster-induced losses. This also reduces basis risk by increasing the funds available to indemnify those who actually experienced losses. The transaction costs, which would be passed on to borrowers as an interest rate load, would be higher than in Stage 2 but less than would exist with a traditional farm-level crop insurance product.

In Stage 4, the MFI would approach a primary insurance provider and begin offering a true loan-linked crop insurance product. The insurance provider would offer a traditional farm-level crop insurance product up to the value of the loan and reinsure against natural disaster risk using IBRTPs. In this stage, the basis risk is transferred from the farmer-borrower to the insurance company. Thus, this stage would require a well-developed insurance sector that over time and space can effectively pool any residual losses not covered by the IBRTP. The cost of transferring the basis risk along with the transaction costs for underwriting, rating, and loss adjusting would be loaded into the premium rate charged by the insurance company. In this stage, the MFI simply receives a fee from the insurance company for serving as a low-cost delivery mechanism.

New Technologies for Providing Loan-Linked Insurance

As the global donor and reinsurance communities collaborate more on how to transfer major weather risks out of low-income countries, the search continues for improved systems to measure extreme events in an objective and timely fashion. While most low-income countries do measure and record weather data in a fashion that is consistent with World Metrological Organization (WMO) standards, many times gaps in available data and fiscal problems result in poor maintenance of weather stations.

Improved technologies can mean significantly more activity in IBRTPs as global partners gain trust that low-cost technologies can be reliable and trusted to provide timely estimates of potential damage. A key to reinsurance market participation is trust and reliable data.

Remote sensing technologies hold great promise for facilitating the further development of IBRTPs. Remote sensing can be used to quantify anomalies that are associated with drought and flooding. These technologies are also being used to estimate crop yields around the globe. As further advances occur, these technologies can be used to develop effective and cost-efficient IBRTPs. More critically, they offer the opportunity to reduce basis risk by pinpointing geographic zones that are being impacted by extreme events. Basist, et al. (2001) describe how new Special Sensor Microwave Imager (SSM/I) technology can be used to monitor surface wetness. SSM/I technology is superior to infrared technologies in that it can penetrate cloud cover. Also the images can be developed at night. The World Bank is investigating the potential for using SSM/I for assessing flooding events that negatively impact rice yields in Bangladesh and Southeast Asia. Reinsurers that sell IBRTPs have expressed a keen interest in this technology since it would provide a secure and reliable source of data on which to base IBRTPs.

Conclusion

This article shares thoughts on how to enhance microcredit and microfinance through linkages with IBRTPs. In low-income countries, limited access to savings, lending, and insurance institutions contributes to the existence of poverty traps. While significant progress has been made in offering microcredit in low-income countries, the progress has generally bypassed agricultural lending.

In rural areas of low-income countries, financial and insurance markets are limited by asymmetric information, high transaction costs, and correlated loss exposure. IBRTPs offer hope for addressing these market limitations. IBRTPs transfer correlated risks, are not susceptible to asymmetric information problems, and have low transaction costs. However, purchasers of IBRTPs are exposed to basis risk whereby individuals can have a loss and not receive a payment.

Efforts to introduce IBRTPs into rural areas of low-income countries have faced two challenges. The first is finding low-cost delivery mechanisms. The second is attempting to address the basis risk inherent in IBRTPs. MFIs provide an existing, low-cost mechanism for delivering the benefits of IBRTPs to rural areas of low-income countries. Linkages to microfinance can also help mitigate the basis risk in IBRTPs.

Improved remote sensing technologies offer significant promise for developing secure and independent moisture-based IBRTPs (e.g., drought and flooding). These IBRTPs could be loss adjusted in real time for the geographic areas that are most impacted. This would greatly reduce the transaction costs of offering IBRTPs in low-income countries for global reinsurers.

The three examples presented in this article demonstrate that these ideas have moved well beyond the conceptual stage. In India, the MFI, BASIX, has been selling rainfall insurance (a form of an IBRTP) to individual farmers as well as purchasing IBRTPs to reinsure the risk in their portfolio. In Mongolia, the World Bank pilot project, Index-Based Livestock Insurance, has caused lenders to think about linking this particular IBRTP to loans made to livestock herders. In Peru, MFIs are investigating IBRTPs based on ENSO 1+2 as a mechanism for transferring the risk of loan defaults associated with major flooding events.

The work in Peru has also stimulated efforts to develop a general model for linking IBRTPs to lending. This model is flexible enough to be applied in various low-income countries. It allows for tradeoffs to be made between basis risk and transaction costs and provides a logical sequence for the development of agricultural insurance that addresses the classic problems of: 1) correlated losses; 2) high delivery costs; 3) high underwriting and monitoring costs; and 4) high loss adjustment costs. The model also provides a mechanism for using IBRTPs to transfer natural disaster risk out of the local community using existing MFI delivery mechanisms.

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