Context
In the agricultural sector of many developing countries, weather risk is pervasive and remains one of the major constraints limiting farmers from accessing loans necessary to expand their production and improve productivity. Agricultural lenders particularly worry about high rates of default in the event of drought. Several years of successful lending can be entirely offset by one year of drought. When production fails, lenders commonly find it politically and practically difficult to call in loans. These risks are reinforced by lack of collateral and the high costs of monitoring and enforcing repayment across thousands of farmers. The end result is that credit access is limited, and interest rates are high.

Out of millions of smallholder farm households in Malawi, only 50,000 currently access credit from formal financial institutions for the purchase of agricultural inputs. Other smallholders access loans provided through informal credit and savings associations, but this group is also a small percentage of the sector. In the past, a much larger number of Malawian smallholders were able to borrow. Malawi’s commercial banks had traditionally focused on lending to larger commercial farms, yet also maintained a portfolio of loans for smallholder farmers. This portfolio has also substantially contracted over time.

While many factors have contributed to the decline in formal sector lending to Malawian smallholders, one important factor has been the periodic incidence of weather-related events, especially drought. Smallholder loan defaults have typically reached high levels in years where major growing areas have experienced drought. Loan repayment rescheduling has been done, yet arrears have tended to remain high. Over time, the number of smallholder clients in good standing with the banks has declined sharply.

Currently, some three-quarters of agricultural credit to smallholders is directed to producers of tobacco. Tobacco production in Malawi is required to be sold through auctions. The auction-based sales are tied to a farmer payment system. Loans provided to farmers can be automatically recovered through a ‘stop-order’ system run by the auction houses. Similar systems for smallholder loan recovery do not exist for other cash or food crops, although financing is also done through various contract farming systems involving processor/traders. Most tobacco growers who access

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credit also draw upon credit to finance their production of maize or other staple food crops. While there are some 350,000 Malawian smallholders growing tobacco, less than 15 percent of these currently access formal credit. Without better addressing weather-related risks, it is unlikely that banks in Malawi will be able to sustainably lend for smallholder agriculture.

While major national droughts are infrequent in Malawi, drought is common most years in one or another part of the country. In 2004/05, the country experienced a devastating drought leading some 40 percent of the smallholder population to rely on food aid distributions that year. In 2005/06, most of the country received favorable rainfall, but farmers in a few major production zones experienced shortages of rainfall and reduced harvests. In 2006/07, Malawi obtained a record maize harvest, in part due to favorable rain in much of the country. However, even in the same year, pockets of drought affected a number of areas and others were affected by flooding. In effect, rainfall risk is endemic, and must be factored into the costs of doing business, including the costs of providing agricultural credit.

**Approach – Index-Based Drought Management Tools**

Since 2005, the Commodity Risk Management Group (CRMG) of the World Bank’s Agricultural and Rural Development (ARD) department has been working in Malawi to pilot index-based weather insurance as a means to manage the weather-related risks of providing credit to farmers. Experience with agricultural insurance in Malawi has been minimal. Insurance against hail damage was offered to a small number of farmers, but insurance companies chose not to continue offering this insurance due to heavy losses in the initial years of the program. Because insurance has largely been unavailable to farmers, they have typically relied on informal methods of risk management and, in extreme years, reactive relief operations for food security. The financial sector has attempted to remedy loan defaults through the rescheduling of loan repayment, though this has had limited success.

**Box 1. Index-Based Weather Insurance**

An index-based weather insurance policy for rainfall links possible insurance payouts with an index calibrated with the rainfall needs of the crop being insured. These needs are summarized in a simple crop model relating rainfall to crop growth and by studying past crop losses from past weather events. Payouts may be linked with one or more growth periods (e.g. crop establishment, crop flowering, grain filling) of the crop. If too little or too much rain falls during any of these periods, a payout is automatically required. Partial drought may be linked with a partial insurance payment, and a severe drought or excessive rainfall may be linked with a full payout of the insurance claim.

A main advantage of this index-based approach is the payout is not based on the condition of the crop, rather on the indisputable rainfall record that is available in near real-time so that claims can be automatically triggered to farmers when adverse rainfall events occur. The primary limiting factor to this approach is the requirement that farmers are situated close (e.g. within 20 kilometers (km), depending on topography) to a rainfall station with reliable communication and good historical data. Additionally, the contracts are based on an index rather than actual losses on a farmer’s field, which means the potential mismatch between payouts and actual losses, also known as basis risk, is possible.
The partners involved in this project since 2005 include the Insurance Association of Malawi (IAM), Malawi Rural Finance Corporation (MRFC), Opportunity International Bank of Malawi (OIBM), the National Association of Small Farmers of Malawi (NASFAM), and in more recent years the Malawi Union of Savings and Credit Cooperatives (MUSSCO), Malawi Savings Bank (MSB), contract farming companies Alliance One, Limbe Leaf and Cheetah, the National Association of Small Farmers of Malawi (NASFAM), and the Malawi Meteorological Services Department (MMSD). The World Bank has provided technical assistance in developing rainfall indices, contracts, and administrative procedures for programs, monitoring the pilot, and supporting the full array of operational partnerships. To carry out its work in country, the World Bank has partnered with insurance intermediary, MicroEnsure.

To date, the index-based insurance contracts piloted in Malawi cover the value of the input loan, not the crop. If there is drought, the insurance payout repays part of the costs of the loan. Insofar as the risks of loan default are reduced, the costs of credit should decline and banks should be willing to extend larger quantities of credit to more farmers. The Malawi pilot program tests the capacity and willingness of banks and insurance companies to provide index-based weather insurance, and the impacts on credit supply and costs.

**Pilot Program**

During the initial 2005/2006 cropping season, 892 farmers located within 20 km of four weather stations purchased index-based weather insurance, which was embedded into a loan agreement for groundnut production inputs. The groundnut sector was chosen for this pilot operation because i) the crop is relatively drought sensitive, ii) farmers had been reluctant to invest in adopting new groundnut seed varieties due to its high cost, and iii) a farmers union established a new marketing system for groundnut, which aimed to support loan recovery at the point of sale.

The 2005/2006 groundnut pilot year faced some problems related to input quality, product communication, and loan repayment. The pilot also demonstrated some difficulty educating farmers about the index-based weather insurance because there was a general lack of knowledge of or experience with insurance, and many farmers had never before accessed credit from a formal financial source. However, the program’s stakeholders believed that these problems could be overcome with improvements in program design and that the results were promising enough to continue the program in 2006/2007.

During the 2006/2007 cropping season, the groundnut pilot expanded, with the addition of maize and a fifth weather station for 1,710 groundnut farmers. Maize coverage was only offered in conjunction with the production and purchase of coverage for groundnut. Stakeholders involved were hesitant to offer a product that
only covered maize since price volatility and fragmented marketing would make it difficult to recover loans. Financiers believed that the profits on the associated cash crop would cover the maize loan of farmers.

These pilots stimulated interest from banks/financiers and supply chain participants such as processing/trading companies and input suppliers. The pilots surfaced some initial ideas on implementing weather insurance programs and when and how these instruments could improve access to credit and manage risk. This included potential opportunities for index insurance programs in other supply chains where side selling could be minimized and where there were established marketing and production schemes such as contract farming operations. However, while the pilots created enthusiasm for the product, they also demonstrated that other risks within the supply chain have a serious impact on both loan recovery rates and the sustainability of a stand-alone index insurance scheme. During the initial pilot operation, banks learned that the groundnut supply chain and the new marketing arrangement were not sufficiently organized to recover loans from the point of sale. As is common in Malawi, farmers engaged in side selling and purposively defaulted on loans to the bank even though rainfall conditions were good for groundnut production. Banks involved in the pilot therefore faced a dilemma: although the weather insurance product provided protection against adverse weather risk, it was not able to strengthen the contractual relationships within the groundnut supply chain. Side-selling to avoid loan repayment remained a serious problem with no clear solution. As a result, the banks agreed that the weather insurance tool would have more utility in a commodity sector with stronger supply chains, such as tobacco, where contract-farming arrangements were common, and in paprika, tea, coffee and cotton where they are developing.

With these lessons and conditions in mind, stakeholders began working to develop a program that could be a sustained, national initiative. During the 2007/08 season, the program expanded to the tobacco sector. The tobacco sector in Malawi represents the largest pool of current recipients of credit in the country with much of the lending being provided by commercial banks for medium to large farmers or by MRFC, a state supported rural finance organization, to small farmers. Despite the current lending, demands for credit are high among tobacco farmers because of the input needs associated with tobacco production and a general lack of access to sufficient credit by smallholder farmers. Because all tobacco in Malawi is sold through an auction, there is a constriction point that allows banks to recover loan payments directly from the auction before farmers receive their sales proceeds. This creates more certainty for the lenders, who have an assured and trusted mechanism for recovering loans.

In 2007/2008, weather insurance covered a portfolio of loans jointly held by a tobacco processing/trading company, Alliance One, and a bank, OIBM, rather than individual loans held by farmers. OIBM bought an index-based weather insurance policy from the IAM in November 2007. The policy covered flue-cured and burley tobacco Alliance One farmers within 30 km of Lilongwe and Kasungu weather stations. Though the policy was a portfolio policy designed to cover the OIBM and
Alliance One’s exposure, the contract was based on individual insurance policies so that the companies could easily associate payouts from particular stations to farmer groups and crops. OIBM and Alliance One shared the cost of the insurance with the farmers, but did not engage in detailed farmer communication efforts on the product given the pilot nature of the approach. Since tobacco is a higher-value crop than groundnut, the IAM was able to establish contacts with the international reinsurance market for these products for the first time. A portion of this risk was reinsured by the IAM to the international risk markets in 2007. All of the companies, and a number of new players, are planning to expand this program during the 2008/2009 season. Depending on their preferences, players will follow either the portfolio approach pioneered in 2007 (Alliance One and their banking partners) or the farmer-level approach piloted in 2005 and 2006 (Limbe Leaf and their banking partners).

Lessons Learned
The work on the index-based weather insurance program in Malawi has highlighted several issues that will be critical for the sustainability of future work.

Index-based weather insurance is only one tool to mitigate the risks of agricultural finance and supply chain relationships. It focuses on only one or two aspects of production risk. The groundnut pilot revealed that problems related to production, marketing and sales can still undermine credit repayment, and therefore the value of the insurance policy. Complementary investments are needed to strengthen contracting relationships and reduce side marketing. These may include the establishment of credit bureaus to track delinquent farmers, the strengthening of extension support to assure inputs are well used, and improved marketing strategies assuring timely payment for agricultural products structured in ways that farmers can understand. The best prospects for integrating index-based insurance into wider agricultural risk strategies occur within relatively well-developed supply chains. Stand-alone weather index schemes are unlikely to be effective or sustainable. Integration into supply chains will help manage other risks related to agricultural production that cannot be managed through weather insurance. In Malawi, this includes tobacco, paprika, cotton, tea, and selected other cash crops. Furthermore, in many cases, without linking these programs directly to finance, farmers will lack both the capital to pay the insurance premium and sufficient incentive to use scarce resources on risk management. Most cash crop growing smallholders in Malawi are still quite poor—with per capita incomes below US$2 per day—but do not represent the poorest segments of rural Malawi.

Although it is the most important commodity and staple crop of Malawi, maize has a very weak supply chain and poor market dynamics. Lack of warehousing, financing, and market intermediation, combined with erratic interventions by government, make providing insurance to the maize sector virtually impossible. For staple food production it is essential to employ a range of risk reducing or mitigating measures (technology, agronomic practices, crop storage, etc.) and insurance can supplement by supporting recovery when other measures fail. In most cases, insurance will be offered in conjunction with an insurance product for a cash crop. Since most farmers
are growing cash crops and food crops at the same time, the potential profits from the cash crop may, in some cases, be leveraged to gain access to finance for investment in inputs and insurance for food crops.

The low density of automated rainfall stations in the country currently limits the size of the pilot program in Malawi. **Increased investment in meteorological services is needed in order to expand the potential market for index-based insurance.** As an example, currently there are an estimated 110,000 smallholder tobacco growers that cultivate within close vicinity to the existing network of reliable and daily-reporting weather stations. If 53 rain gauges were automated, an additional 200,000 farmers could potentially be included in the program. This growth would need to be gradual and could take a number of years to match the desired pace of portfolio growth among lending institutions. Increasing station density would also serve to reduce basis risk and build trust among insurers and reinsurers that the data can be used for settlement. Insurance companies will need to engage national weather authorities in order to facilitate access to necessary data and improve infrastructure to support the broadening/scaling up of insurance applications. From a donor perspective, investments in weather station/data infrastructure can be further justified by broader objectives associated with improving early warning, crop forecasting systems and climate monitoring.

**Insurance capacity and technical expertise will be critical for continued growth of the sector.** For the pilot program, the insurance sector was willing to engage in this business as long as the volumes of business grew slowly and they were able to transfer at least a portion of the risk to the international market. The program was phased in through a process of pilot activities aligned to customized training. In order for this program to become a sustained initiative, the insurance sector in Malawi will need to take a larger role in contract design and underwriting. This includes improvements in the areas of risk analysis, crop modeling and contract design. To date, contract design for the tobacco, maize and groundnut pilots has been carried out by the World Bank with help from local experts. In the coming years, the Insurance Association of Malawi will need to take over responsibility for these functions in collaboration with experts from the Meteorological Services Department, the Ministry of Agriculture and Food Security, the staff of participating commercial banks, contract farming companies and local research institutes such as International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and Agricultural Research and Extension Trust (ARET).

Expanding the weather insurance program in Malawi will also provide an opportunity for the local insurance industry to grow a larger, more diversified portfolio of risk. This should allow insurance companies to reduce premiums and reach volumes large enough to continue attracting the risk capacity of the international reinsurance market. As the program expands, it will be necessary to further educate the Insurance Association of Malawi so that individual companies can take more direct responsibility for the insurance product and portfolio management.
During the past three years of pilot work in Malawi, nine insurance companies worked together to underwrite the risk from the program. Regulatory approval was not required by the insurance regulator for the product in the pilot phase, yet the regulator closely observed the program development. **If the private sector is interested in expanding the program, it will need to engage the national regulatory authority so that it gains a better understanding of the risks being insured, and the strategies for sharing these liabilities.** The regulatory authorities will then need to consider revisions to the existing insurance framework so that it includes explicit reference to index-based insurance products.

**Next Steps**

The initial pilot programs in Malawi have provided guidance on the appropriate applications, benefits and limitations of index insurance in Malawi. This has created a demand and opportunity to expand index-based weather insurance programs in Malawi. The first three pilots involved sums insured of approximately US$30,000, US$150,000 and US$300,000 respectively. For 2008, the sums insured are greater than US$2 million at 8 weather stations and the IAM have secured reinsurance for their portfolio. Stakeholders in the tobacco sector were keen to scale up the size of the market significantly further for the 2008/9 season to support smallholder credit operations both as part of contract farming arrangements and as a product for individual clients. However, plans were limited by the current weather infrastructure. New commercial banks are also interested in entering into the smallholder credit arena thanks to the availability of the index-based weather insurance product and new weather stations that are being installed to support this market growth in future years. After the 2008/2009 season, the program will look to expand to additional crops including paprika, cotton, tea, and selected other cash crops.

In conclusion, the World Bank and country team in Malawi have been working with local stakeholders to transition these pilot programs into sustainable private sector driven businesses. To do that, investments are needed to overcome the main impediments to market growth by 1) expanding the weather stations and information, 2) supporting the growth of the weather insurance market in Malawi through training, capacity building and technical assistance for banks and the insurance community, 3) identifying additional supply chains that could benefit from a complementary weather insurance product, and 4) establishing an appropriate regulatory framework for these products. Most of this work will be financed through the new Malawi Agriculture Development Program Support Project, which will receive financing from the World Bank, Norway and the Global Environmental Fund.

Continued monitoring will seek to draw firmer lessons from this experience that may be useful for neighboring countries. Important questions remain about how to address repayment risks in weaker supply chains, the viability of targeting small farmers with this product, and whether index-based weather insurance can contribute to either reducing the cost of or expanding access to credit in the agricultural sector.