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Managing Drought Risk for Food Security in Africa

An Innovative Solution in Malawi

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Malawi periodically experiences drought leading to shortages of grain on the domestic market and a sharp increase in consumer prices. Consumers, including many of the poorest farmers in the country, experience difficulty obtaining enough grain to meet their family requirements. One method to reduce the risks of grain shortfalls is to improve the capacity of farmers to produce enough grain even when drought occurs—for example, through input subsidies and efforts to improve water use efficiency. An additional measure is to finance the establishment and distribution of strategic grain stocks. However, in the occasional year when drought is most extreme, supplementary assistance will still be needed in the form of expensive food imports and, possibly, food aid.

The impact of extreme drought in Malawi has been far reaching, and the resulting macroeconomic instability has been a major constraint to growth and poverty reduction in the country. This is because agriculture constitutes approximately 40 percent of Malawi's economy, largely smallholder farming and rain-fed maize production. As a result, the weather patterns deeply affect agricultural production, Malawi's GDP, and threaten the country's food security (Government of Malawi and World Bank, 2007a,b).

Photo: Curt Carnemark/The World Bank

In response to a request from the Government of Malawi, the World Bank has been exploring ways to use proactive market-based tools to assist in managing risks associated with the country's weather-related volatility in maize production. One of the instruments that has been developed as part of the larger framework to reduce agricultural risk is an index-based weather risk management contract (Syroka & Nucifora, 2008).

SOLUTION

As part of the risk management component of its agricultural development strategy, the Government of Malawi, with support from the World Bank's Agricultural and Rural Development Department (ARD), Treasury (TRE), and the UK Department for International Development (DfID), initiated an innovative pilot transaction in October 2008[1], which transferred the financial risk of severe and catastrophic national drought to the international risk markets. This involved the purchase of a weather derivative contract from the World Bank Treasury which, simultaneously, entered into a mirroring back-to-back transaction with a leading reinsurance company.

The weather risk management instrument is being introduced as one of the tools that can be used to support the Government's Agricultural Development Programme (ADP). The Programme aims to strengthen maize markets in the country and provides protection against price and production shocks for food security. The transaction will provide predictable and early financing, in the form of a payout, in the event of a severe national drought. The contract is based on rainfall measurements and does not depend on actual national maize production in the country. As such, payments can be triggered as soon as the contract ends in April, rather than waiting for the harvest assessments in June. Such contingent financing should help the Government in its drought preparedness and contingency planning,

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empowering it to more efficiently protect its food supply in response to a looming crisis. For example, a payout could be used to secure Government access to maize, for distribution during the lean months ahead, at a capped import price as early as possible. With future grain prices capped, the private sector can better predict the government response and can respond to shortages with commercial imports. Strengthening local market responses to production and price shocks in the country is a critical part of the overall risk management and food security strategy.

"Agriculture is a major sector and source of growth for the Malawian economy," said Honorable Goodall Gondwe, Minister of Finance of Malawi. "Market-based, weather-risk management tools can not only help protect against the adverse effects of drought, but are also a potentially valuable tool for enhancing Malawi's food security."

ROLE OF THE WORLD BANK

On the policy and technical front, the World Bank's Commodity Risk Management Group in ARD has been working with the Government of Malawi for several years in the area of insurance and market-based maize risk management capacity building by providing technical expertise and training on potential instruments, and working with local stakeholders to develop an agricultural risk management framework for such tools (Hess & Syroka, 2005; Rohrbach et al. 2007). In Malawi, ongoing work related to this initiative will be supported by the forthcoming Agriculture Development Programme Support Project (Malawi ADP-SP^2), which will help the Government develop an integrated risk management framework for food security. The $53.3 million, five year Malawi ADP-SP started in 2008, supported by the World Bank, Norway, and the Global Environmental Fund, includes funds for weather stations, improvements in maize modeling and early warning systems, and training and technical support to key ministries on weather risk transfer and complementary risk management instruments.

Photo: ©Joanna Syroka

On the transaction side, the World Bank Treasury's intermediation facilitated access to the international risk market. By being the market face of the transaction, covering all negotiations with Malawi, the Treasury attracted more counterparts, reduced start-up costs for market players, and increased confidence in the transaction on both sides. The World Bank's intermediation role is temporary and it is expected that countries will deal directly with the market in the longer term. The goal in Malawi is to build national capacity and train ministerial personnel to facilitate future direct transactions between the country and financial markets.

HOW IT WORKS

The weather derivative contract is structured as a put option on a rainfall index. The index links rainfall—its amount and distribution during the agricultural season, October 2008 to April 2009 (inclusive)—to the expected level of maize production in the country. Under the contract, if the index falls to 10 percent below the historical average, indicating rainfall has been below average for maize production, Malawi will receive a payout of up to a maximum of $5 million in May 2009. DfID financially supported the premium payment for the option on behalf of the Government and is interested, along with other donor partners, in supporting a series of piloting transactions over the next few years with the understanding that the Government would take a greater share in the premium payment and eventually establish their own annual budget lines for the premium costs.

The index for Malawi is constructed using rainfall data from 23 weather stations throughout the country and is based on the Government's own national maize yield assessment model. The model is a rainfall-based Food and Agriculture Organization of the United Nations water balance crop model that the Government has been using since 1992 to forecast maize production in the country each season. The index picks up the well-documented historical drought events in 1992, 1994, 1995, and 2005. A weather derivative contract based on such an index could have triggered timely cash payouts to the Government in those years, which could have been used to finance a Government drought response. If there is a payout in May 2009, Malawi is interested in using the

proceeds to buy a contingent call option to cap the import price of maize early. This type of maize price/supply hedge was used successfully by the Government following the drought in 2005-06 and saved the Government approximately $50-$90 per metric tones (MT) on 60,000 MT of maize. Had Malawi been in the position to purchase maize in June 2005 or, ideally to purchase a call option, it would have saved approximately $80-$120 per MT imported, using conservative estimates. Such a combined weather and price risk management approach would have had resulted in a four-fold saving for the Government on the maize imported and would have reduced the need for external aid assistance in that year. This example illustrates how a weather derivative payout could be leveraged within a comprehensive framework to effectively unlock the value of paying up-front for timely and guaranteed contingent funds.

The initial contract for Malawi is relatively small and several piloting seasons will be necessary to understand the scope, limitations, and ideal size of such a transaction and its role within the Government's ADP strategy in relation to other risk management tools within the Government's portfolio. As more experience is gained, and this framework is developed, other uses for macro, weather-risk management contracts can also be considered, in addition to those directly related to maize. An example is scaling-up social safety net activities in Malawi in a time of drought; such a scheme is currently being developed in Ethiopia by the World Bank, The World Food Programme, and the Government of Ethiopia.[3]

PREREQUISITES

There are several critical prerequisites to successfully implementing a weather-risk transfer program. The primary technical precondition is an index that faithfully represents the weather risk in question and is constructed using weather data that adhere to quality requirements. These criteria include reliable and trustworthy on-going daily collection and a long historical record to allow for a proper actuarial analysis of the weather risks involved. The strict nature of these criteria is to ensure that the underlying weather data used is objective, easily accessible, and independently verifiable, thus ensuring that information between the two entities is shared equally and the nature of the risk being transferred is transparently communicated. Experience shows that in most countries—including least developed countries that are often agriculture-based economies that value and, therefore, often have a long history of monitoring weather for agriculture—there are enough weather stations and data to begin initiatives at the national level. In Ethiopia, work is on-going using satellite data.

Box 1. Prerequisites for a weather-derivative contract

1) *Index* – An index that dependably captures national drought risk.
2) *Data* – High quality historical weather data and reliable real-time communication.
3) *Premium* – An annual, non-refundable premium must be paid by the "insured" party or a donor.
4) *Integration* into larger risk-management strategy.

Box 2. Advantages and Limitations

Advantages

1) *Payout is timely and guaranteed in time of need* because it is index-based and does not depend on actual national maize production assessments.
2) *Creates opportunities to access the market for risk transfer* – systemic risk can be transferred from a low-income country to international actors that actively seek this risk.
3) *Cost savings* – through early, more efficient and planned response to weather shocks due to predictable crisis financing.
4) *Effective use of scarce funds* vs. incurring opportunity costs by earmarking capital to cover infrequent shocks.
5) *Strengthens Government's ability to finance responses to natural disasters* reducing the country's reliance on traditional humanitarian emergency appeals and promising greater dignity for those in need.

Limitations

1) *Basis Risk – the potential mismatch* between the contract payout and the actual maize production losses whereas the payout does not adequately indemnify the Government for losses.
   - *Investing in weather data and index specification will help minimize basis risk.*
2) *Indexed Risks* – the contract only covers risks that can be indexed—not other natural and man-made risks to food production (e.g., pest infestation, input supplies, civil strife, etc.).
   - *Other Government risk management and mitigation measures are needed to deal with the risks to agricultural production that cannot be indexed.*
3) *Premium* – these transactions have an upfront cost.
   - *Contingency planning and preparedness is critical to unlock the value of securing timely and guaranteed funds.*

Strategically, the index-based, weather-risk management activity must be integrated into a country's comprehensive risk management strategy. Anchoring risk management activities within this type of larger investment program is critical to ensuring local ownership of the strategy. A connection with the larger investment program ensures integration with wider policy issues and the multi-donor coordination can help identify synergies with other programs. It also allows initiatives to transition from a pilot phase into a long-term, comprehensive, risk-management strategy for the Government by supporting the development of an appropriate institutional framework for such tools over time.

RELEVANCE TO OTHER COUNTRY TEAMS

While this first transaction has been designed to assist Malawi manage its risk, the tool is appropriate for any country whose staple food crop is at risk to systemic weather events, such as drought. This new intermediation service by World Bank Treasury is available to all low- and middle-income countries.[4] National-level agricultural weather risk management is also being investigated in Burkina Faso and Morocco. Weather-risk management transactions can be customized according to each country's specific needs: the type of weather hazard, level of protection, and the estimated financial loss associated with a severe and catastrophic event. The applications of this product are multiple and span from agriculture and energy production to hedging revenues based on tourism.

FOR MORE INFORMATION

For more information about market-based, weather risk management tools, or to discuss whether this approach may be appropriate for your region, contact Marc Sadler, Senior Agricultural Economist, at the Agricultural and Rural Development Department of the World Bank or the Treasury Department of the World Bank.

The paper can be downloaded from www.worldbank.org/rural or contact ard@worldbank.org

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1 http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21937445~pagePK:34370~piPK:34424~theSitePK:4607,00.html

2 http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,contentMDK:21816729~menuPK:2246551~pagePK:2865106~piPK:2865128~theSitePK:258644,00.html

3 Hess, Wiseman, Robertson, 2006; Ethiopia - Second Productive Safety Net APL Project, 2006: http://go.worldbank.org/LGM05M00L0

4 http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21816597~pagePK:64257043~piPK:437376~theSitePK:4607,00.html?cid=3001

The ARD Notes series on Commodity Risk Management aims to disseminate the results of World Bank research that describes the feasibility of developing countries' ability to utilize market-based tools to mitigate risks associated with commodity price volatility and weather. This ARD Note was written by Joanna Syroka and edited by Kara Bunte.