SCIENTIFIC AMERICAN.COM

July 15, 2007

Making Development Less Risky (extended edition)

Innovative forms of insurance could unshackle a green revolution in Africa and other poor nations

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Life at the bottom of the world's income distribution is massively risky. Households lack basic buffers-saving accounts, health insurance, water tanks, diversified income sources and so on-against droughts, pests and other hazards. The bodies of the poor often lack enough nutrients to rebuff diseases. Even modest shocks, such as a temporary dry spell or a routine infection, can be devastating.

These risks have knock-on effects. To take one prime example, the expected economic return on the use of fertilizer use very high in Africa, yet impoverished farmers cannot obtain it on credit, because of the potential for a catastrophic loss in the event of a crop failure. Their households cannot bear the risk of a loan, and so-with no access to better agricultural inputs--they remain destitute.

Managing risk is therefore important not only for smoothing out the well-being of these farmers over the good and the bad years, but also for enabling their escape from extreme poverty. If the risks facing poor farm households can be reduced, their creditworthiness can be increased. And increased creditworthiness permits them to invest in higher-yield activities, including higher value-added farming.

For these reasons and others, including a probable rise in the volatility of climate shocks accompanying human-induced climate change, financial risk management is likely to come to the forefront of strategies for poverty reduction. Micro-finance has already introduced financial markets for the poor. Now micro-insurance and other kinds of financial risk management will likewise yield important tools.

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Considerable financial innovation is needed. Traditional crop insurance is almost non-existent in Africa for several reasons. Suppose an insurance company tried to sell a crop insurance policy to a peasant farmer with a one-acre farm. A traditional policy would specify payments in the event of measured crop losses from specified hazards (such as drought, pests and temperature extremes), and would require an actuarial model of applicable risks and the completion of a contract. Payments would occur only after the verification of losses and (usually) of the underlying adverse events.

But in impoverished Africa, multiple problems would routinely be fatal to such a policy: the absence of an actuarial risk model; adverse selection (farmers with especially risky conditions would seek the contracts); moral hazard (farmers covered by insurance might fail to take other protective measures) and enormously high costs of marketing, signing and assessing losses relative to the value of the policy.

Two huge innovations are correcting these weaknesses. First, instead of insuring a farmer's actual crop losses, a policy can diversify much of a farmer's risk by creating a financial derivative, such as a weather-linked bond that pays the farmer in the event of a seasonal drought, dry spell or other adverse weather shock.

A weather station or satellite can observe a drought objectively, eliminating any to examine the outcomes on individual farms. Moral hazard and adverse selection are irrelevant, because the price of the "drought bond" depends on the objective probabilities of measurable weather shocks, not on the characteristics or the behavior of an individual farmer.

The second key strategy is to combine the weather-linked bonds with other financial services to the farmer. Indeed, these services are best bundled to an entire farm cooperative that includes hundreds or thousands of farmers. For example, a bank would make a seasonal loan to a farm cooperative for the mass purchase of fertilizers and high-yield seeds, with the loan repayment due to be reduced or waived entirely in the event of a drought, and the repayment schedule calibrated to the extent of the drought. The bank, in turn, would buy a weather-linked bond to ensure itself against the drought.

Smallholder farmers can thus obtain the fertilizer and other crucial inputs they need, and neither the farmers nor the bank must bear unmanageable risks in a loan contract. Contract farming, in which the inputs are financed not by a bank but by a buyer of the farm output (for example, a purchaser for supermarkets), can provide the same bundle of financing with insurance.

These financial arrangements may seem like dry, technical adjustments of modest import, but our experience at the Earth Institute at Columbia University suggests that financial engineering and clever contract design will allow a breakthrough in the modernization of agriculture in Africa, the Philippines and other highly risky places. Earlier this year, the Earth Institute and the reinsurer Swiss Re designed and implemented a rainfall-index contract for the Sauri Millennium Village in Western Kenya.

The experience was heartening. Climatologists demonstrated, for instance, how satellite data could be used in a novel way to design a relevant financial instrument to defray the high climate risks facing the village. Other institutions, such as the World Bank, the World Food Program, the Government of Ethiopia and other insurance companies, are striving to mitigate climate risks in other impoverished regions.

The importance of-and potential for-an agricultural breakthrough is critical for Africa's escape from poverty. Its farmers do not produce enough food to feed a hungry continent. Yet existing technologies could enable them to do so, if the financing could be arranged. Africa's green revolution is therefore likely to be accompanied by a supportive African financial revolution that brings state-of-the-art risk management techniques to bear on behalf of the world's poorest people.