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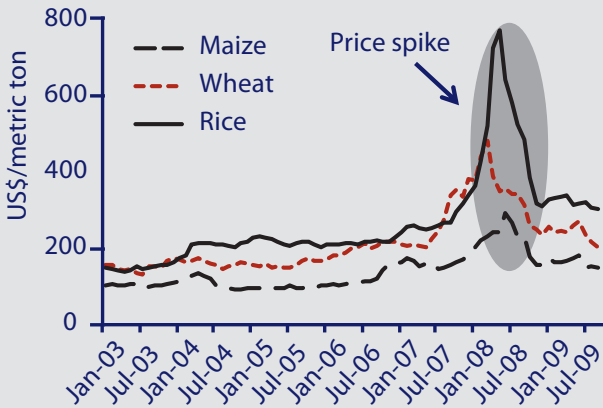


ARE FOOD-SECURITY RISKS FOR POOR PEOPLE ON THE RISE?

Recent food-price and economic shocks have further jeopardized the food security of developing countries and poor people, pushing the estimated number of undernourished people over one billion. Known and unknown food-security risks appear to be on the rise. Increasing uncertainties raise critical questions about how to quickly, viably, and sustainably manage familiar risks and emerging new ones. The poor, particularly those who depend on food purchases, both in rural and urban areas, are highly vulnerable to market risks such as high and volatile agricultural prices, which peaked in 2007–08 (Figure 1). In many low-income countries, the food crisis is far from over as prices remain stubbornly high and income and employment opportunities are reduced. In response to the high food prices, which are not matched by equivalent increases in income, poor households are forced to consume less food and to shift to even less-balanced diets. Households also spend less on other goods and services, such as clean water, sanitation, education, and healthcare, which are essential for their short- and long-run welfare. Within households, women tend to be disproportionately hurt.¹

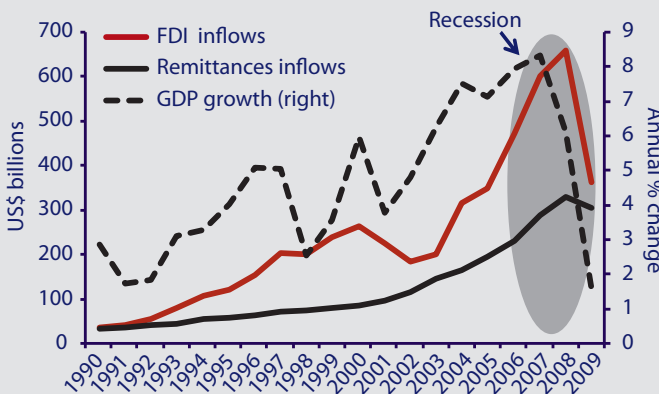
¹ Quisumbing, A., R. Meinzen-Dick, and L. Bassett with M. Usnick, L. Pandolfelli, C. Morden, and H. Alderman. 2008. *Helping women respond to the global food price crisis*. IFPRI Policy Brief 7. Washington, D.C.: International Food Policy Research Institute.

Figure 1—Market risks: High and volatile world grain prices



Source: FAO (Food and Agriculture Organization of the United Nations). 2009. *International commodity prices database*. Rome.

Figure 2—Economic recession risks: FDI, remittances, and growth in developing and transition countries



Sources: **FDI inflows** are from UNCTAD (United Nations Conference on Trade and Development). 2009. *Foreign Direct Investment database*. New York and Geneva and UNCTAD. 2009. *World investment prospects survey 2009–2011*. New York and Geneva. **Remittances inflows** are from Ratha, D., S. Mohapatra, and A. Silwal. 2009. *Outlook for remittance flows 2009–2011: Remittances expected to fall by 7–10 percent in 2009*. Migration and Development Brief 10. Washington, D.C.: World Bank and World Bank. 2009. *Migration and remittances data July 2009*. http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1110315015165/RemittancesData_July09 (Public). xls. **GDP growth** is from IMF (International Monetary Fund). 2009. *World Economic Outlook database*. Washington, D.C.

Notes: Data for 2008 are estimates and data for 2009 are projections. FDI inflows for 2009 are projected based on data for only the first quarter of 2009.

The global financial crisis and economic recession place additional stresses on the poor in a number of developing countries, where the result is decreased economic growth, reduced inflow of foreign direct investment (FDI), and reduced remittances (Figure 2). The economic recession leads to declining real incomes and human capital investment through reduced opportunities for education, employment, and capital. Policy shocks, such as ill-informed trade policies and harmful taxation policies, also have severe impacts on many of the poor, as do political and social instability caused by war, civil conflict, and civil unrest. In addition to *covariate risks* (shocks that simultaneously affect many people in the same location), *idiosyncratic risks* (illnesses, accidents and disability, death of a household member, and loss of property) acutely affect particular households or individuals in the community. Susceptibility to such idiosyncratic risks is often linked to factors such as gender, age, social status, occupation, and geographic location.

The global and national food systems are complex systems, which are typically characterized by non-linear and difficult-to-predict changes with sudden disruptions and tipping points that may be passed suddenly. Poor people are the least able to predict most of the risks in complex food systems and therefore, are also the most affected by their combined occurrences. Public policy must focus on preventing these risks.

FAMILIAR AND UNFAMILIAR RISK PATTERNS

Broad patterns

It has long been recognized that the poor face many risks, but is food security in particular becoming more risky than it has been in the past? Several global risks that can potentially have severe impacts on the food security of the poor have recently increased and are likely to increase further in the long term. These include:

- The risk of *high and volatile food prices*, which limit poor people's food consumption, diet quality, and spending on health and general welfare, is likely to increase in the future. According to IFPRI global scenario analyses, food prices are not likely to fall to their 2000–03 levels in the next decade, and price volatility is increasing.²
- *Financial and economic shocks*, which lead to job loss, expensive and scarce credit, and decreased demand for agricultural commodities, are also likely to persist in some parts of the developing world.
- The impacts of *climate change*, including an increase in the incidence of extreme weather events such as droughts and floods and a decrease in yields in developing countries,³ will further exacerbate food insecurity. These impacts will be severe because the majority of the poor depend on agriculture as a source of food and income.⁴
- The risks of epidemic outbreaks, *human disease, and crop and livestock disease* are likely to increase and spread faster with urbanization, globalization, and climate change.

These complex global food and health system risks can assume a variety of patterns, and can become catastrophic “perfect storms.” In addition, societal and political risks—such as food riots, destabilization of governments, and domestic and transborder conflicts—can also result from these food system risks.

In a successful development process, idiosyncratic risks gradually decline as public policies provide more insurance and safety-net coverage and the capacity of households to “cope” is strengthened. Raising life expectancy, even among the poor, is an example of this. However, the food and financial crises pose global covariate risks, which also may increase idiosyncratic risks. These two categories of risks are linked, especially among the poor. The stylized pattern of risks in a framework of “decreasing-increasing” likelihood, and “small-large” severity of impact for the poor is depicted in Figure 3. It suggests that most of the covariate risks are found in the “increasing” and “large” top right corner of the risk space.

Microlevel risk patterns and consequences

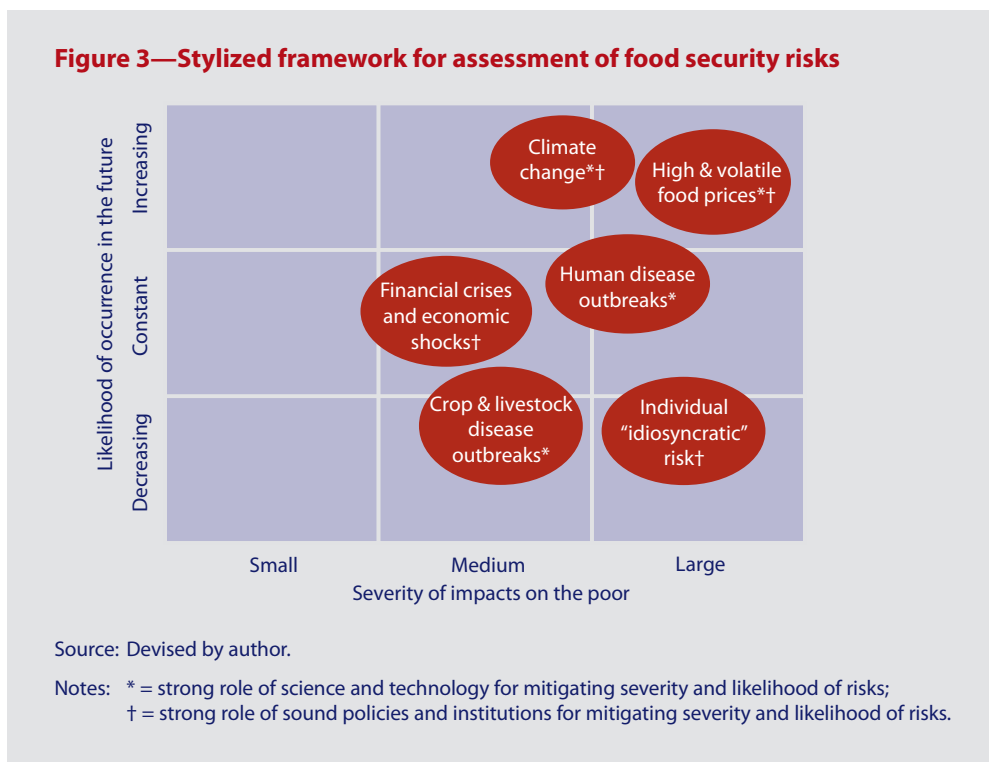
Poor people face a variety of risks that threaten their livelihoods and health, deplete their asset base, and undermine their food and nutrition security. The malignant effects of these risks are often greatest for the poorest, who have a more limited capacity to manage risk and cope with shocks. Not only are the consequences of uninsured risk harsher for the poorest, but the shocks themselves can catapult households deeper into poverty, making a recovery difficult if not impossible. The situations

² von Braun, J. with A. Ahmed, K. Asenso-Okyere, S. Fan, A. Gulati, J. Hodinott, R. Pandya-Lorch, M. W. Rosegrant, M. Ruel, M. Torero, T. van Rhee, and K. von Grebmer. 2008a. *High food prices: The what, who, and how of proposed policy actions*. IFPRI Policy Brief 2. Washington, D.C.: International Food Policy Research Institute.

³ Easterling, W. E., P. K. Aggarwal, P. Batima, K. M. Brander, L. Erda, S. M. Howden, A. Kirilenko, J. Morton, J.-F. Soussana, J. Schmidhuber and F. N. Tubiello. 2007. Food, fibre and forest products. *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, (eds.) Parry, M. L., O. F. Canziani, J. P. Palutikof, P. J. van der Linden, and C. E. Hanson, Cambridge University Press, Cambridge, UK: 273–313.

⁴ Nelson, G. C., M. W. Rosegrant, J. Koo, R. Robertson, T. Sulser, T. Zhu, C. Ringler, S. Msangi, A. Palazzo, M. Batka, M. Magalhaes, R. Valmonte-Santos, M. Ewing, and D. Lee. 2009. *Climate Change: Impact on Agriculture and Costs of Adaptation*. Food Policy Report. Washington, D.C.: International Food Policy Research Institute.

Figure 3—Stylized framework for assessment of food security risks



that lock the poor in poverty are referred to as "poverty traps."⁵

These shocks emanate from the physical, social, political/legal, and economic settings in which households find themselves.

1. The physical setting refers to natural phenomena such as the level and variability of rainfall and the natural fertility of soils, as well as distances to markets and quality of infrastructure.
2. The social setting captures such factors as the existence of certain behavioral norms, social cohesion, and strife.

3. The political and legal setting captures the mechanisms by which the "rules of the game" are set.
4. The economic setting refers to the level, distribution, and variability of returns on assets.

Drought, social strife, arbitrary application of the rule of law, and changes in food prices are all examples of shocks that emanate from these four settings.⁶

The likelihood that a household is food insecure or vulnerable to food insecurity partly reflects, again, the settings that it finds itself in. But it is also a function of the assets held by the household and the returns to these assets. When faced with

⁵ For example, farmers in Ethiopia who suffered livestock and other losses in the droughts of the 1980s found it difficult to recover and experienced considerably slower income growth in the decades that followed (Dercon, S., 2004, Growth and shocks: Evidence from rural Ethiopia, *Journal of Development Economics* 74: 309–29). Shocks, such as the civil war in Zimbabwe in the early 1980s, can also reduce investment in human capital, with long-lasting consequences on lifetime earnings (Alderman, H., J. Hoddinott, and B. Kinsey, 2006, Long-term consequences of early childhood malnutrition, *Oxford Economic Papers* 58: 450–74).

⁶ Hoddinott, J. 2008. *Social safety nets and productivity enhancing investments in agriculture*. Mimeo. Washington, D.C.: International Food Policy Research Institute.

a shock, households adjust through changes in production, labor, assets, transfers, and consumption. The capacity to cope with shocks depends on the human skills and resources of the poor households, as studies in Sudan and Ethiopia illustrate.⁷ The households' success in pursuing and attaining insurance against food-security risks plays a large role in determining the outcome of subsequent shocks. Research has also shown that households accumulate and liquidate assets to smooth consumption across time.⁸ However, once assets approach a threshold below which looms a poverty trap, households face a difficult decision: whether or not to sell assets, which could lead to permanent income loss and reduced consumption, with potential health- or life-threatening consequences. A study exploring the welfare dynamics in rural Kenya and Madagascar found that every poor household interviewed could ultimately trace its poverty to an asset or health shock.⁹

DEALING WITH RISKS: HOUSEHOLD, COMMUNAL, PUBLIC, AND PRIVATE STRATEGIES

The poor are very much aware of the traditional risks they face and have for generations employed household and communal strategies for risk management (before a shock occurs) and risk coping (after the shock has hit). Governments and the private sector have also developed risk-management strategies.

At the *household level*, households may decide to grow a mix of crops with differing levels of susceptibility to climatic shocks and returns. In addition, they may plant crops in different locations, plant temporally diversified crops (crops that grow to maturity at different speeds), or they might cultivate two or more crops on the same land. Similarly, households might diversify into off-farm activities such as producing handicrafts, engaging in casual wage labor, or embarking on seasonal migration. Accumulating low-return but liquid asset holdings and entering into informal credit arrangements are among other risk-reduction or mitigating mechanisms.¹⁰ While these strategies have the potential to deal with idiosyncratic and small covariate shocks, they are ineffective in the face of large covariate shocks, such as a world food-price crisis. Furthermore, many of these risk-management and coping mechanisms can have irreversible, negative long-term impacts on nutrition, health, education, and assets, which may result in poverty traps. Poor households faced with risks are inclined to seek a balance of outcomes through strategies that take into account a series of tradeoffs between long- and short-term concerns. In the event of extreme shock conditions, the balance shifts toward more immediate concerns, and the highest priority becomes survival.

At the *community level*, informal mutual support networks can serve as effective means of risk sharing within extended families, neighborhood clans, and tribal groups, but only if a few members are in hardship. Funeral associations, such as *iddirs* in Ethiopia,

⁷ von Braun, J., T. Teklu, and P. Webb. 1998. *Famine in Africa: Causes, responses, and prevention*. Baltimore, MD: The John Hopkins University Press for the International Food Policy Research Institute.

⁸ Paxson, C. 1992. Using weather variability to estimate the response of savings to transitory income in Thailand. *American Economic Review* 82: 15-33; Rosenzweig, M., K. Wolpin. 1993. Credit market constraints, consumption smoothing, and the accumulation of durable production assets in low-income countries: Investment in bullocks in India. *Journal of Political Economy* 101: 223-244; Udry, C., 1994. Risk and insurance in a rural credit market: An empirical investigation in Northern Nigeria. *Review of Economic Studies* 63: 495-526; Lim Y., and R. Townsend, General equilibrium models of financial systems: Theory and measurement in village economies, *Review of Economic Dynamics* 1, no. 1 (1998), 59-118.

⁹ Barrett, C. B., P. P. Marenja, J. G. McPeak, B. Minten, F. M. Murithi, W. Oluoch-Kosura, F. Place, J. C. Randrianarisoa, J. Rasambainarivo, and J. Wangila. 2006. Welfare dynamics in rural Kenya and Madagascar. *Journal of Development Studies* 42(2): 248-277.

¹⁰ Alderman, H., and C. Paxson. 1992. Do the poor insure? A synthesis of the literature on risk and consumption in developing countries. Policy Research Working Paper Series 1008. Washington, D.C.: The World Bank; Morduch, J. 1995. Income smoothing and consumption smoothing. *Journal of Economic Perspectives* 9(2): 103-114; Townsend, R. 1995. Consumption insurance: An evaluation of risk-bearing systems in low-income countries. *Journal of Economic Perspectives* 9(3): 83-102.

provide insurance for their members in the case of death or health risks.¹¹ In West Africa, savings groups such as *esusus* provide informal credit support. However, some community members remain excluded because community-based risk-management mechanisms depend on trust and reciprocity. Also, these mechanisms are likely to break down in the face of large negative shocks affecting the whole community since risk can no longer be shared between members. In sum, both the household- and community-level strategies cannot successfully buffer long-lasting shocks. As these strategies are often triggered only after the shock has occurred, they have much less capacity to mitigate the impact of the shock.

In terms of *public-sector* strategies, governments have developed mechanisms to address the failings of household and community risk-mitigating methods. These include safety-net programs to transfer food and income to households vulnerable to shocks and to households most affected in their aftermath. But many of these programs do not always reach their intended beneficiaries because of either poor design or implementation. In India, for instance, only 42 percent of subsidized grains reach the intended beneficiaries due to leakages and diversions.¹² Subsidies have high fiscal and economic costs, especially when they are not properly targeted. During the food crisis in 2007–08, countries that introduced or scaled-up poorly targeted subsidies were confronted with large budget costs, as occurred in several North African countries and Pakistan.

Many governments have also used public buffer stocks, price regulation, and trade policy instruments to prevent market volatility and to stabilize prices. However, these mechanisms have adverse secondary

effects. During the 2007–08 price spike, countries accumulated additional stocks, closed commodity exchanges, and imposed export bans that undermined the potential gains from international trade and market mechanisms. Quasi-governmental institutions such as marketing boards created in the past to provide production incentives, stabilize food prices, and enhance food security are increasingly expensive. They can also be inefficient and market distorting when they restrict trade, reduce competition, and receive preferential treatment for credit and transportation.¹³

At the level of the *private sector*, insurance has been successful in filling some risk-management gaps in developed countries. However, it is largely unavailable to poor households in developing countries facing the risks of death, illness, agricultural production failure, job loss, and asset loss. In 2008, emerging economies constituted only 14 percent of the world non-life insurance market; Africa's share was about 1 percent, with South Africa accounting for half of the continent's market.¹⁴ In 23 of the poorest countries, with a total population of about 370 million people, there was no evidence of active formal non-social-security insurance schemes for the poor.¹⁵ This is largely due to higher delivery costs in developing countries coupled with more pronounced insurance problems such as moral hazard, adverse selection, and fraud. Weak institutional and legal structures impede the development and sustainability of insurance markets tailored to the poor. Actual uptake and retention of insurance is also limited due to high costs of premiums, inappropriateness of existing products, and gaps in information about formal insurance mechanisms.

Agricultural production is especially hard to insure since shocks such as extreme weather events

¹¹ Asfaw, A., and J. von Braun. 2004. Is consumption insured against illness? Evidence on vulnerability of households to health shocks in rural Ethiopia. *Economic Development and Cultural Change* 53 (No. 1, October): 115–130.

¹² Programme Evaluation Organisation. 2005. Performance evaluation of targeted public distribution system. Planning Commission, Government of India. New Delhi.

¹³ Rashid, S., A. Gulati, and R. Cummings, Jr. (eds.) 2008. *From parastatals to private trade: Lessons from Asian agriculture*. Baltimore, MD: The John Hopkins University Press for the International Food Policy Research Institute.

¹⁴ Swiss Re. 2009. World insurance in 2008: Life premiums fall in the industrialized countries—strong growth in the emerging economies. Sigma Study 3. Zurich.

¹⁵ Roth, J., M. J. McCord, and R. Berold. 2008. *Agricultural micro insurance, global practices and prospects*. Appleton, Wisconsin: MicroInsurance Centre.

cannot be controlled, covariate risks affecting whole communities are frequent, and production loss assessment is difficult. For these reasons, many of the crop insurance schemes initiated in the 1950s and 1960s have not been sustainable, and agricultural insurance markets in developing countries remain underdeveloped despite the needs of poor farmers. However, there has been some progress in developing new insurance mechanisms (see Box 1). In a few developing countries, insurance schemes targeted to poor people have been implemented on a relatively large scale. India's National Agricultural Insurance Scheme, for example, has been effective in insuring farmers against production losses. In 2005–06, the program (which was introduced in 1999–2000) covered 25 states,

79 million farmers, and 129 million hectares of land. These impressive numbers, however, are still small for the scale of India and correspond to only 14 percent of farmers and 15 percent of total crop area.¹⁶

Insurance schemes in developing countries are scarce, and governments support many of them through direct ownership or subsidies. More than 40 percent of all agricultural insurance schemes in emerging markets are government owned, and about 5 percent have government involvement.¹⁷ However, governments' capacity to sufficiently and quickly compensate the large number of small farmers in developing countries for agricultural production shocks is limited due to limited budget resources and weak administrative capacity. Thus, the uninsured risk of

Box 1 Index-based weather insurance

Innovative insurance products, such as index-based weather insurance (both crop and livestock), have been tested as pilot projects in some developing countries, including India, Malawi, Mexico, Mongolia, Tanzania, and Thailand. In index-based weather insurance contracts, estimates of financial losses are based on an index, or a proxy, instead of on the actual losses of each policyholder. The index could be based on variables such as regional rainfall, wind speed, temperature, storm day count, regional area yields, and regional livestock mortality rates. The insurance provider starts compensating policyholders for losses when the index passes a predetermined critical threshold. Payments increase incrementally as the index deteriorates, and policyholders receive the maximum amount possible when a predetermined upper limit is reached. The rainfall-index faces the problem of a big gap between projected yield and individual yield and it has high institutional requirements; the yield-index can overcome these issues, but it is more complicated to develop.

Efficient weather insurance indexes eliminate moral hazard and adverse selection, since the policyholders cannot influence the changes in the index, and both the provider and the policyholder have the same knowledge of the likelihood of the shifts in the index. They also greatly decrease monitoring and administration costs—since actual losses do not need to be calculated—and eliminate common risks.

To ensure the efficiency of index-based insurance, substantial improvements are required in providing easily accessible and reliable weather information in developing countries. Also, the targeted beneficiaries need to be well informed about the program to make certain that they adopt it.¹⁸

¹⁶ Raju, S. S., and R. Chand. 2008. A study of the performance of National Agricultural Insurance Scheme and suggestions to make it more effective. *Agricultural Economic Research Review* 21: 11–9.

¹⁷ Roth, J., M. J. McCord, and R. Berold, 2008.

¹⁸ The reasons index-based insurance schemes are seen as superior compared to the traditional insurances are discussed in numerous papers (see, for example, Skees, J., and B. Barnett. 2006. Enhancing microfinance using index based risk-transfer products. *Agricultural Finance Review* 66: 235–250).

poor farmers remains high and leads to distortions in production, savings, and asset accumulation decisions that further exacerbate poverty. For example, poor uninsured farmers tend to adopt safer technologies, and thus forego the potentially large improvements in productivity that new but riskier technologies offer. Insurance can be used as a prerequisite for access to credit, which enables poor households to make less risk-averse decisions and adopt new technologies that would help increase their productivity and income.

ADDRESSING FOOD-SECURITY RISKS WITH A COMPREHENSIVE APPROACH

Today's increasingly high-risk environment coexists with new opportunities to increase the affordability and accessibility of risk-management mechanisms. Innovative information and communication technologies (ICTs), for example, are reducing high delivery costs, lowering premium payments, and expanding the reach of risk management mechanisms and related public and private services.¹⁹

The severity of the impacts of food-security risks is unpredictably high both for the poor and for low-income countries. The outlook for the future, however, does not have to be grim if the appropriate policies and management strategies are employed to mitigate each type of risk in a comprehensive manner. Policies, institutions, and technology have important roles to play in mitigating the severity and likelihood of food-security risks. Global risks need to be addressed through coordinated global action, and national risks mainly through domestic policy action. Trade restrictions, for instance, have not only local but global effects, as shown in the food crisis. Country-level actions, especially in poor countries, have very limited effectiveness in addressing global food-security risks and cause distortions that have high costs. To enhance improvements in food

security, specific actions need to be taken in a context of inclusive and sound economic policies. In low-income countries, particular attention needs to be paid to agricultural growth-enhancing policies.

It is imperative to rethink existing policies and strategies and to explore underutilized and new options in order to deal effectively with emerging risks. IFPRI's global policy consultation in 2006–08 on the poorest and hungry identified several key emerging strategies to reduce poverty and hunger: focusing on inclusive growth; improving access to assets and markets; phasing in social protection more quickly and comprehensively; accelerating investments in health and nutrition programs, particularly for children and women; and including the excluded.²⁰ A comprehensive approach for supporting the poor in managing growing food-security risks includes:

1. productivity enhancement,
2. market and trade opportunities,
3. insurance opportunities, and
4. social-protection opportunities.

Productivity enhancement

Productivity-enhancing mechanisms are needed to help reduce the risks related to agricultural production and markets, as well as to nutrition and health. Investments should be scaled up in agricultural research and development (R&D), rural infrastructure, rural institutions, and information monitoring and sharing. Doubling investments in public agricultural research, from about US\$5 billion in 2008 to US\$10 billion in 2013, would significantly decrease the risk of poverty and hunger. If these R&D investments are targeted at the poorest regions of the world—Sub-Saharan Africa and South Asia—282 million people would be lifted out of poverty by 2020 through income and consumption effects.²¹ The CGIAR will

¹⁹ von Braun, J. 2009. ICT for the poor at large scale: Innovative connections to markets and services. Paper presented at the "ICT for the Next Five Billion People—Information and Communication for Sustainable Development" conference, Berlin, May 12.

²⁰ von Braun, J., R. Vargas Hill, and R. Pandya-Lorch. 2009. *The poorest and hungry: Assessments, analyses, and actions*. Washington, D.C.: International Food Policy Research Institute. Forthcoming.

²¹ von Braun, J., S. Fan, R. Meinzen-Dick, M. W. Rosegrant, and A. Nin Pratt. 2008. *International agricultural research for food security, poverty reduction, and the environment: What to expect from scaling up CGIAR investments and "best bet" programs*. Washington, D.C.: International Food Policy Research Institute.

have to play a key role in this global effort. Investments in innovative, high-impact technologies such as biotechnology, nanotechnology, and ICTs should be increased. ICTs, for example, have the potential to enhance productivity along the entire food chain and create significant positive externalities. Expanded ICT infrastructure could be beneficial for poor rural households through larger economies of scale, reduced physical barriers, and informed decision-making. Increasingly important is the development of innovative ways to provide poor small farmers with access to technologies that are tailored to their needs. An important element in related risk-reduction strategies is the enhancement of drought resistance in food crops and their ability to deal with climate-change-related risks, such as heat stress.

While a host of factors ultimately influences progress in hunger reduction, it is telling that those low-income countries that achieved higher agricultural growth also made more significant progress in reducing hunger, as measured by the Global Hunger Index (GHI).²²

- Among the 20 low-income countries whose agricultural sector grew the fastest between 1990 and 2006, 11 are also among the top 20 countries whose GHI score decreased the most (Table 1).
- A simple regression analysis, holding per capita national income constant, indicates that GHI scores decrease by 1.9 points for each percentage point of agricultural growth in a sample of 35 low-income countries. For instance, in Ethiopia or Bangladesh (which reduced their GHI scores between 1990 and 2006 by 13 and 11 points, respectively, and whose average annual agricultural growth was 4 and 3.5 percent, respectively) the role of agricultural growth has been quite strong for the GHI reductions.

- However, the same statistics for a larger sample of 65 developing countries show the power of agricultural growth for hunger reduction is reduced when agriculture has a smaller role in the economy (a reduction of only 1.1 points compared to the above-mentioned 1.9 points in the GHI for each percentage point in agricultural growth).

It is also noteworthy that low-income countries have made greater absolute progress than lower-middle-income and upper-middle-income countries in hunger reduction. This review of change in hunger and agricultural growth reveals that sound growth-promoting agricultural policies can go a long way toward helping low-income countries to achieve food security. Thus, the absence of such policies creates a risk for the poor. It is no surprise then, that in countries such as Burundi, where agricultural growth decreased by 1 percent on average between 1990 and 2006, and Zimbabwe, where growth increased by less than 1 percent and was negative in the latter part of that period, the GHI increased by 7 points and 2 points, respectively.

Because climate change in developing countries will cause yield declines for the most important crops, actions to improve agricultural productivity will need to be even more comprehensive to enhance food security in the future. As Nelson et al. (2009) also point out, climate change will result in additional price increases for the most important agricultural crops—rice, wheat, maize, and soybeans.²³ Higher feed prices will result in higher meat prices. Calorie availability in 2050 will not only be lower than in a no-climate-change scenario; it will actually decline relative to 2000 levels throughout the developing world, and child malnutrition will be 20 percent higher relative to a world with no climate change. This study suggests that agricultural productivity investments of US\$7.1–7.3 billion are needed to raise calorie consumption enough to offset the

²² The GHI is a combined measure of three equally weighted components: (1) the proportion of undernourished as a percentage of the population, (2) the prevalence of underweight in children under the age of five, and (3) the under-five mortality rate. For the most recent GHI, see: von Grebmer, K., B. Nestorova, A. Quisumbing, R. Fertziger, H. Fritschel, R. Pandya-Lorch, and Y. Yohannes. 2009. *2009 Global Hunger Index. The challenge of hunger: Focus on financial crisis and gender inequality*. Washington, D.C.: International Food Policy Research Institute.

²³ Nelson et al. 2009.

Table 1—Top performers ranked by agricultural growth and by progress in hunger reduction, since 1990

Ranking of agricultural growth				Ranking of Global Hunger Index progress			
Rank	Country	Agricultural growth (%)	Change in GHI score	Rank	Country	Change in GHI score	Agricultural growth (%)
1	Malawi*	5.9	-11.6	1	Vietnam*	-12.9	3.9
2	Burkina Faso	5.8	-1.4	2	Ethiopia*	-12.7	4.0
3	Benin*	5.1	-6.7	3	Ghana	-12.0	3.2
4	Mozambique*	4.7	-10.6	4	Malawi*	-11.6	5.9
5	Chad*	4.6	-6.4	5	Bangladesh	-11.2	3.5
6	Cambodia*	4.5	-10.5	6	Mozambique*	-10.6	4.7
7	Lao PDR*	4.2	-10.2	7	Cambodia*	-10.5	4.5
8	Nigeria*	4.2	-6.0	8	Lao PDR*	-10.2	4.2
9	Guinea	4.2	-4.4	9	Djibouti	-9.7	1.2
10	China*	4.1	-5.9	10	Nepal	-7.8	3.0
11	Uganda	4.1	-3.9	11	India	-7.8	2.9
12	Ethiopia*	4.0	-12.7	12	Niger	-7.7	3.3
13	Guinea-Bissau	4.0	1.5	13	Sri Lanka	-7.4	2.0
14	Rwanda	4.0	-4.2	14	Guyana	-7.1	2.6
15	Vietnam*	3.9	-12.9	15	Mauritania	-7.1	0.2
16	Sudan*	3.9	-6.7	16	Benin*	-6.7	5.1
17	Tanzania	3.8	-1.8	17	Sudan*	-6.7	3.9
18	Gambia, The	3.8	0.6	18	Chad*	-6.4	4.6
19	Zambia	3.7	0.4	19	Nigeria*	-6.0	4.2
20	Pakistan	3.6	-3.7	20	China*	-5.9	4.1
Average of all low-income countries		3.3	-4.9	Average of all low-income countries		-4.9	3.3

*Countries that are both among the top 20 performers by GHI progress and by agricultural growth.

Sources: Agricultural growth from World Bank, 2008, World Development Indicators 2008, Washington, D.C. GHI from von Grebmer, K. et al. 2009.

Notes: Agricultural growth measured as the average of agriculture, value added (annual % growth) from 1990 to 2006. Global Hunger Index (GHI) progress is measured as the difference between the 1990 GHI (based on data from 1988–92), and the 2009 GHI (based on data from 2002–07). A negative change in a country's GHI score, indicates an improvement in hunger. Countries with missing agricultural growth values for four years or more were excluded from the analysis. Countries in which hunger has been largely overcome (1990 and 2009 GHI values smaller than 5) also were excluded.

negative impacts of climate change on the health and well-being of children.

Market and trade opportunities

Reducing extreme market volatility requires two collective actions at the global level. First, a small, independent, physical food reserve should be established exclusively for emergency response and humanitarian assistance. Second, a coordinated virtual food reserve and intervention mechanism should be created to help avoid price spikes. The organizational design of the virtual reserve would include a high-level technical commission that would facilitate coordinated releases from reserves and intervention in futures markets. It would also include a global intelligence unit that would signal when prices head toward a spike.²⁴ At the national level, commodity exchanges offer new opportunities for smallholders to manage market-based risk and catalyze production and growth. Commodity exchanges could engage small farmers in the market economy in important ways by generating market information; making product grades, quality, and market-clearing prices transparent; and promoting self-regulation. Warehouse receipt schemes could also reduce market uncertainty and improve efficiency by decreasing the volatility of agricultural supply and prices and the amount of storage losses. For effective performance, warehouse receipts should be supported by a sound legal and institutional system.

Insurance opportunities

To extend affordable insurance to low-income households, new insurance products (such as index-based weather insurance) need to be developed, and new delivery channels (such as nongovernmental organizations, community support networks, and microfinance institutions) should be explored. These new products should be supported by substantial investments in information and technology, including remote-sensing

technology, computer-processing power for real-time satellite analysis, and geographic information databases. Insurance interventions targeted at the poor should build on the existing traditional capacity for addressing risk. Proper insurance regulation should ensure that the poor are reached. In India, for example, insurance companies are required by a government decree to increase coverage in rural areas. For the poorest people who cannot afford insurance, however, government regulation may not be enough. Smart insurance subsidies are needed to make insurance a viable option for their risk management and coping. These subsidies should involve the private sector from the beginning and facilitate a transition to market-based arrangements. At the same time, national and international emergency-response capabilities remain essential for food security and will be indispensable. Their functions, reach, and needed scale, however, will change in the context of a comprehensive approach as outlined here.

Social-protection opportunities

With the food and financial crises, it is vital to re-examine the role of social protection, particularly in preventing hunger risk and protecting the most vulnerable. Social protection is essential for reducing the vulnerability of the poor to risks, as well as for reducing poverty and hunger by providing access to additional income and resources, jobs, healthcare, and good nutrition. Social protection also promotes economic growth by creating individual, household, and community assets, protecting assets from shocks, increasing the effective use of resources, facilitating structural reform in the economy, and reducing inequality.²⁵ In turn, insurance for the poor can provide social protection by improving health, and protecting earnings and assets. Efficient insurance can reach excluded households and individuals, reduce transaction costs, and respond to the needs of targeted beneficiaries (Figure 4). By smoothing consumption

²⁴ von Braun, J., and M. Torero. 2009. *Implementing physical and virtual food reserves to protect the poor and prevent market failure*, Policy Brief 10. Washington, D.C.: International Food Policy Research Institute. Previous papers have identified the link between the future markets and spot markets. See, for example, Pindyck, R. S. 2001. The dynamics of commodity spot and futures markets: A primer, *The Energy Journal* 22 (3), and McKinnon, R., 1967, Futures markets, buffer stocks, and income stability for primary producers, *Journal of Political Economy* 75.

²⁵ Alderman, H., and J. Hoddinott. 2007. *Growth-promoting social safety nets*. 2020 Focus Brief. Washington, D.C.: International Food Policy Research Institute.

during economic shocks, social protection helps to increase future incomes and access to food.

Protective actions—including conditional cash transfers, pension systems, and employment programs—are needed to mitigate short-term risks. Preventive health and nutrition interventions are also needed to avoid long-term negative consequences. Since good nutrition is crucial for children's physical and cognitive development, as well as their productivity and earnings as adults,²⁶ early childhood nutrition actions and school-feeding programs that have positive spillovers to poor households should be strengthened and expanded to ensure universal coverage. The expansion of social protection should be based on existing institutions and broad political and stakeholder support. To ensure financial sustainability and program efficiency, the national tax base should be strengthened, information on the precise nature of nutrition problems should be improved, and proper incentives for beneficiaries and program administrators should be put in place. Effective targeting is also

essential for cost-effectiveness and for reaching the intended beneficiaries. In failed states, however, financial and administrative capacity is lacking for implementing insurance and social protection schemes, leaving the poor without any form of state protection in times of severe crises. In these countries, it is crucial to strengthen capacity and governance practices.

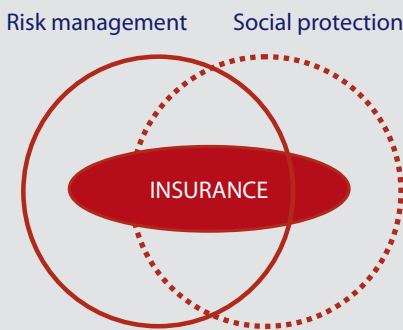
TOWARD A "RISK-REDUCTION REVOLUTION" FOR THE POOR

The Green Revolution in the 1960s and the Micro-finance Revolution in the 1990s made great strides toward addressing the needs of the poor and decreasing their risks and vulnerabilities. Now, insurance for the poor is expanding around the globe, offering new opportunities for managing risks. To quickly transform this expansion into a "risk-reduction revolution" for small farmers and the poor requires institutional innovation. This will require a committed and coordinated effort, including viable and sustainable scaling up of successful programs, experimentation, and cross-country learning.

At the national level, actions in the areas of productivity enhancement, market risk reduction, and insurance and social protection will require prioritization and sequencing depending on country context, institutions, and capacities. International emergency response capabilities will need to adapt and—in view of complex food-system risks—further expand rather than shrink, even in the context of new insurance mechanisms. A comprehensive approach is needed, not just selective progress in each of these action areas.

In the design and implementation of pro-poor social protection, the synergies of different approaches to risk management—traditional, government, and market—need to be explored. Sound public services are key to household risk reduction. Public-private partnerships can help in implementation. It is time to take advantage of the new opportunities to comprehensively enhance the food security of poor people.

Figure 4—Social protection and risk management for the poor



Source: Adapted from C. Jacquier, G. Ramm, P. Marcadent, and V. Schmitt-Diabate. 2006. *The social protection perspective in microinsurance*. In C. Churchill (ed.), *Protecting the poor: A microinsurance compendium*. Geneva and Munich: International Labor Office and Munich Re Foundation.

²⁶ Hoddinott, J., J. A. Maluccio, J. R. Behrman, R. Flores, and R. Martorell. 2008. Effect of a nutrition intervention during early childhood on economic productivity in Guatemalan adults. *The Lancet* 371 (610): 411–16.



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