Managing Food Price Risks and Instability in an Environment of Market Liberalization
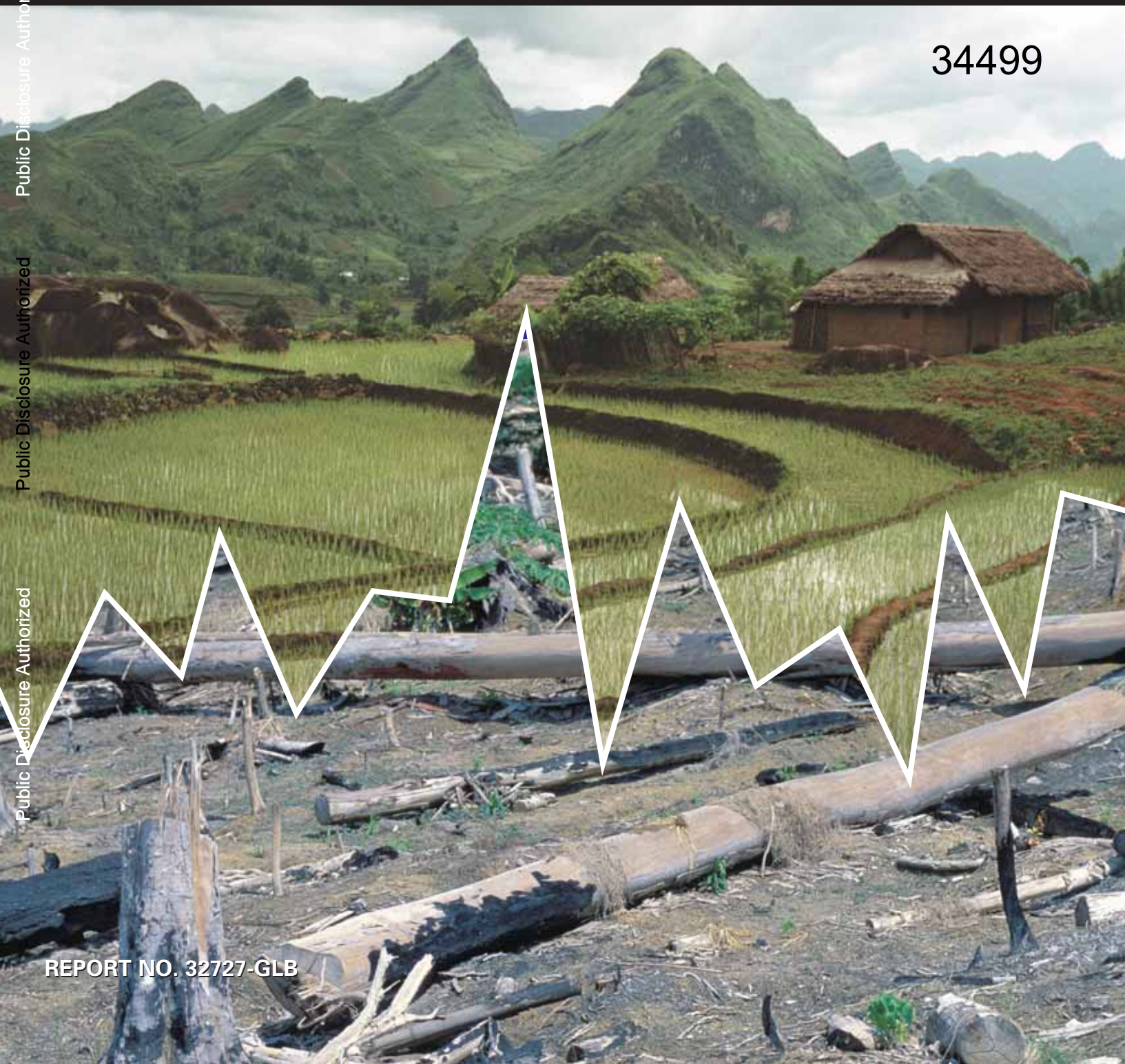
Agriculture and Rural Development Department

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THE WORLD BANK
AGRICULTURE AND RURAL DEVELOPMENT DEPARTMENT

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Acknowledgments

Acronyms and Abbreviations

CLVI	Cuddy–Della Valle Index
CV	Coefficient of variation
FAO	Food and Agriculture Organization
GDP	Gross domestic product
NEPAD	New Partnership for Africa's Development
PSIA	Poverty and Social Impact Analysis
WFP	World Food Programme
WTO	World Trade Organization

Executive Summary

Food price risks and instability are perennial issues that have dogged food policy debates for decades. Their persistence is understandable, given the continued importance of food staples as a wage good, their high share of national income and expenditures in low-income countries, and political sensitivities to sharp changes in food prices.

Since the 1990s these issues have taken on new urgency in the context of market liberalization. The controversy over price instability and its social and political costs has arguably been the Achilles' heel of food market reform programs, programs that have progressed very slowly in many countries, especially with regard to public food marketing agencies. In several cases, reforms have been reversed. Some are reluctant to liberalize food markets because of fears about the potential impacts on food price instability, or out of the conviction that food prices have become more unstable in countries that have liberalized. Others contend that "halfway" reforms create the worst of all possible worlds, where the private sector is encouraged to operate in an environment in which governments continue to intervene in discretionary and unpredictable ways that make prices even less stable.

Over the years commodity price stabilization and risk management have received considerable attention from researchers and policymakers in industrial and developing- country contexts. This new study was motivated by the need to revisit the problem of food price instability and risk in low-income countries and to investigate the benefits and costs of alternative policy responses. In particular the study aimed to provide guidance on how to make the transition from state-dominated markets to private markets in ways that do not expose producers and consumers to the risk of unacceptable price spikes and collapses.

Five key questions are addressed:

1. What are the sources and magnitudes of food price shocks?
2. What are the magnitudes (actual and potential) of the economic and social costs stemming from food price instability in low-income countries?
3. What is the status of food market reforms, and what can be learned from the experience to date?
4. How can countries sequence reforms in ways that promote efficient market development and protect the interests of the poor?
5. What are appropriate policy responses to food price instability and risk in a liberalized market environment?

This report marshals the "best thinking" globally to outline a framework for analyzing policy responses—conventional and emerging. The report also reviews experiences with policy reform across low-income countries of Asia and Africa, including relevant experience from other regions (particularly Latin America, where most countries have implemented extensive reforms). The report draws extensively on contributions from academics and practitioners who shared their knowledge at an international workshop on this theme held in Washington, D.C., from February 28 to March 1, 2005 (see appendix 1 for a list of papers that are available at http://www.passlivelihoods.org.uk/default.asp?project_id=240&nc=4921.) Finally, this report draws on the broader knowledge base within the World Bank and the wider development community.

THE SIZE OF THE PROBLEM

Country context defines the problem and its magnitude. Food policy decisions must be tailored to the individual circumstances of each country, but as a starting point for identifying an appropriate policy response, countries can be grouped roughly according to common needs and risks. A simple framework for classification focuses on low-income countries and regions in which food consumption is dominated by one staple: rice in Asia and Madagascar, wheat in Pakistan and in the Middle East and North Africa, white maize in eastern and southern Africa, and millet and sorghum in Sahelian countries of West Africa. These are the countries and regions where the poor are most exposed to sharp movements in the prices of food staples, especially spikes in the prices paid by consumers. These countries were further classified according to their potential exposure to price shocks from domestic climatic events and to shocks generated by instability in world grain markets.

Based on this classification, rice and wheat importers, especially in the least developed countries such as Madagascar, Bangladesh, and the Republic of Yemen, are most exposed to world price shocks. Many other Asian and middle-income countries are exposed as well, but their greatly improved infrastructure and foreign exchange reserves place them in a much better position to handle such shocks than three decades ago, when many public food marketing agencies were established. Landlocked countries in southern Africa that depend on maize are most exposed to domestic sources of shocks, as

are, to a lesser extent, other landlocked African countries such as Ethiopia and some Sahelian countries. Food production in these countries is highly variable, and their capacity to operate on world markets is limited by high transport costs and foreign exchange constraints.

The first conclusion—obvious but too often overlooked—is that food policy decisions and market reforms are highly specific to their context. More attention needs to be paid to a country's particular stage of development, food consumption patterns, agroclimatic factors, geographical situation, and institutional setup in designing appropriate food policies.

A country typology hides considerable heterogeneity within countries between rural and urban areas, regions, and households, but generally the consumption patterns of urban households, even poor households, have become more diversified over time, giving them more flexibility to handle sharp spikes in the price of the dominant food staple. In rural areas, the empirical finding that emerges consistently in most parts of the developing world is that a majority of households are net food buyers, while a relatively small minority of wealthier households are grain sellers. The poor, who are overwhelmingly net food purchasers, suffer disproportionately from high food prices. Among producers, the impacts of low food prices are at least partially offset by the tendency for prices and output to be negatively correlated.

This leads to a second major conclusion: Food policy should generally emphasize the impacts of unstable food prices on consumers—rural and urban, and especially the poorest and most vulnerable—more than impacts on producers.

HOW SIGNIFICANT ARE FOOD PRICE SHOCKS?

At the global level, variability in world grain prices remains significant, with coefficients of variation around trend of 20 to 30 percent for rice, wheat, and white maize. Although there is no evidence that variability has increased—indeed, prices were most unstable in the 1970s—there is concern that changes in world markets, especially reductions in the stocks held by major producers (China, the United States, and the European Union) and rapid growth in demand in Asia, may provoke higher and less stable prices in the future.

The evidence is limited on the magnitude and frequency of price instability in domestic food markets, actual and potential. In general, producer prices for wheat and maize in importing countries have been more stable than international prices, reflecting transactions costs of transmitting international prices into domestic markets, as well as continuing policy interventions in many countries that insulate domestic markets from world prices. There is no convincing evidence to date that domestic food price instability has increased over time in the sample of countries reviewed.

Domestic price instability tends to be highest in two groups of countries. Latin American countries, where macroeconomic shocks, especially sharp exchange rate devaluations, have resulted in highly unstable prices, comprise the first group. African countries, especially landlocked countries where the wedge between export and import prices is high because of high transport costs and poor market infrastructure, comprise the second group. The high import-export parity wedge, combined with high domestic production variability, increases the impact of domestic shocks, especially drought, on prices. A contributing factor, particularly in southern Africa, is the uncertainty created by unpredictable government interventions in food markets and imports.

Under a full market liberalization scenario, food price shocks, whether from global or domestic sources, are potentially significant in many situations. For example, in Ethiopia the price wedge between import and export parity has allowed maize prices in Addis Ababa to fluctuate from about US$50 to nearly US$250 per ton in recent years, and probably more in more remote regions. Likewise, countries depending on rice imports have faced world export prices falling from US$340 per ton in 1996 to a low of US$170 per ton in 2001, and rebounding to more than US$300 per ton in 2005.

WHAT ARE THE COSTS OF PRICE INSTABILITY?

The costs of unstable food prices can include the loss of economic efficiency, detrimental impacts on the welfare of the poor (including undernutrition and reduced survival), and negative macroeconomic externalities that retard economic growth. There is little consensus and generally weak evidence on the magnitude of these costs. The effects of unstable food prices on economic efficiency are probably not large in most cases. The most persuasive cases for the negative effects of high food prices can be made for effects on household food security and nutrition and on macroeconomic performance. These costs could be significant in certain situations—for example, in the poorest countries with poor infrastructure, weak capacity to import, dependence on a single dominant staple, and susceptibility to drought—all characteristics of several landlocked countries in Africa.

LESSONS AND EXPERIENCES FROM POLICY REFORMS

The record of food market reforms in low-income and even many middle-income countries is mixed at best. Some countries, such as India, have maintained their parastatal systems more or less intact, but mounting costs have made most of these systems unsustainable. Other countries, such as Bangladesh, Mali, and Mozambique, have introduced and sustained significant reforms that have enabled them to weather a major natural disaster at a much lower cost than in the past, with tolerable levels of price instability. Notably, these countries have exploited trade opportunities, especially regional trade, as the main mechanism for stabilizing domestic grain prices.

But what about the many countries stuck halfway in the reform process, hovering between old parastatal models and private, market-led approaches? In this situation, discretionary interventions to meet an emergency (or even just a declaration of the intention to intervene) have been especially destructive to incentives for private-sector participation.

Other important lessons have been learned from the varied experience with market reforms. Many countries paid insufficient attention to designing an orderly sequence of reforms that systematically increased the role of the private sector and built confidence in a market-based approach. Nor was sufficient attention given to political economy considerations (such as vested interests that maneuver to maintain the status quo) and to designing a reform program that takes account of these realities.

MOVING FORWARD: BROADER POLICY OPTIONS

Policies are chosen within a set of constraints formed by the political system and by limitations

on availability of public funds. These constraints force governments to make explicit tradeoffs in allocating public expenditures, and it is imperative that these tradeoffs are made in ways that enhance the long-run performance, growth, and stability of the food sector and the economy as a whole.

This study highlights a number of policy options for moving forward, recognizing that it is especially difficult to make generic recommendations for such a country-specific and complex topic. One general recommendation is that food policy decisions, rather than focusing on price stabilization options per se, should take a holistic approach to food security in which long-run productivity growth and market development constitute the first priority. This leads to four specific recommendations:

1. Address problems of food price instability and food insecurity in a holistic framework that includes:
   - Measures to improve overall productivity of food staples, especially investments in research and development and irrigation
   - Measures to reduce the severity of domestic shocks caused by climatic events (such as measures to promote irrigation or crop diversification)
   - Measures to improve the overall efficiency of markets, including investments in transport and communication infrastructure, storage, information systems, market regulations, and institutional arrangements that improve coordination along the market chain
   - Measures to mitigate the impacts of shocks, including market-based measures (such as forward pricing and weather insurance) as well as countercyclical safety nets.

   The corollary of this recommendation is that direct public interventions in food markets to manage food price risk should be a last resort.
2. Reallocate resources from short-run, "fire-fighting" interventions to manage food prices, to investment in long-run market and private-sector development, including incentive frameworks, market institutions, and infrastructure consistent with item 1 above. Nonetheless, even investments in market development must be sequenced in ways that confer measurable gains in the short to medium term. Public-private partnerships (for example, through farmer and trader associations) to develop

production and market information systems, storage, and market networks are often the first priorities for improving food market performance.
3. Liberalize trade, especially by promoting regional trade, for one of the most effective "quick wins" for reducing food price volatility in small and medium-size countries. Liberalization of trade shifts a country's exposure away from domestic shocks and toward global price shocks, but global shocks are usually lessened if trade with neighboring countries is encouraged. Regional trade requires action on a number of fronts, including long-run investments in infrastructure, but the development of (a) consistent rule-based policies to lift discretionary export bans and import restrictions, (b) smooth border-clearing procedures, and (c) harmonized regulations, such as phytosanitary rules, would go a long way toward creating the incentives for private traders to engage in regional trade.
4. Sequence market reforms in a consistent manner that creates space for the private sector to operate. **"**Big bang" approaches to market reform have rarely worked in practice. For markets, including regional markets, to develop over the long run, consistent progress must be made in opening space for the private sector. More analytical work and policy dialogue will provide a better basis for designing a logical, sequential program of reforms. Finally, governments should implement the agreed program in a predictable and consistent manner. A generic sequence that would gradually increase the role of the private sector includes:
   - Eliminating blanket subsidies and revising remaining subsidies in ways that level the playing field for the private sector and target the poor
   - Removing remaining restrictions on grain movement within a country and reducing restrictions on grain imports and exports
   - Moving away from fixed procurement and release prices toward seasonally adjusted prices and price bands
   - Tendering remaining public procurement, imports, and even storage to the private sector, using a highly transparent process to increase efficiency, reduce rent-seeking, and build private-sector capacity.

SPECIFIC POLICY OPTIONS FOR MANAGING PRICE INSTABILITY AND RISK

Within an overall public policy strategy for food systems that emphasizes the transition to private markets and long-run market development, there are roles for the public sector in enhancing price stability and managing food sector risks. Two of these will be a standard part of the toolkit of most food security strategies: piloting and facilitating the adoption of various market-based risk management instruments, and countercyclical safety nets. Two others may have a role in certain situations and, when accompanied by specific safeguards to ensure "arm's-length," rule-based management: variable tariffs and strategic reserves.

Market-Based Risk Management Instruments

Several risk management instruments show considerable promise in managing food price risks, including facilitation of private storage (warehouse receipt systems), futures and options markets, and weather-indexed insurance. These alternatives are rarely used in low-income countries, partly because the public sector dominates food markets and partly because the enabling conditions are lacking, such as access to finance, information systems, communication systems, market regulations, and capacity.

The major focus of the public sector should be to create an environment that facilitates the private sector's adoption of these instruments, especially in the following ways:

- Warehouse receipts, for use initially by larger-scale farmers, processors, and traders, and over the longer term by the small-scale sector. Warehouse receipts have much potential to reduce risks from seasonal price fluctuations, develop finance markets, encourage investment in storage, and eventually (when widely adopted) to reduce both seasonal and interannual price fluctuations. They cannot be implemented if an appropriate regulatory and business environment is lacking, however.
- Futures and options using existing global markets, for use mainly by large-scale traders and processors and strong intermediaries, such as well-developed farmer or trader associations, to reduce exposure to risks from global mar-

kets. These alternatives are already available where the basis risk is low, which appears to be the case for wheat and white maize for many countries, using U.S. and South African futures markets.
- Weather-indexed insurance for use by farmers, safety net programs, and (potentially) consumers. While not designed specifically for price risk management, weather-indexed insurance can mitigate the impacts of price spikes or climatic shocks. Successfully piloted at the farm level in India and Mexico, weather insurance can be used more widely where weather indices are good proxies for crop losses, and especially if domestic insurers can reinsure on global markets.

The public sector should support the development of a basic enabling environment for these instruments by conducting the analytical work and building the capacity to pilot and scale up programs that promote the development of financial systems, communication and information systems, regulations, and an appropriate business climate.

Some recent discussions have also noted the potential for the public sector to use market-based instruments to reduce exposure to risks from its own operations in food markets. Yet direct trading of futures, options, or insurance contracts by governments or public food agencies should be approached with extreme caution. Large government futures or options positions are not recommended for two reasons. First, even if the public sector is successful in using these instruments, the public sector is likely to undermine incentives for the private sector to use them. Second, given the poor record of public-sector interventions in food markets, there is little reason to believe that the public sector's use of market-based risk management instruments would be immune to the same inefficiencies and rent-seeking forces that have plagued conventional public food agency operations.

If governments do choose to become involved in direct procurement to manage a *small* strategic food reserve, market-based risk management strategies may have a potential role in these operations. In such cases, options have distinct advantages over futures—first, because of their role as price insurance, and second, because purchasing options requires only a single, up-front premium, whereas futures can entail continuing margin calls if prices move unfavorably. Even when using options, an

effective hedging strategy requires considerable investments in analytical capacity and a long-run commitment, otherwise hedging could add to risk rather than reduce it. The misuse of futures and options may expose governments to even greater fiscal risks and rent-seeking than conventional public-sector operations in food markets, unless special management safeguards are in place.

Countercyclical Safety Nets

A second major priority for interventions to manage risks is to support the development of countercyclical safety nets in ways that are market friendly. Countercyclical safety nets, which kick in when high food prices or low production threaten household food security, are an integral part of any program to manage food price risks. Food aid and food-for-work programs remain the most important safety nets in many countries. In the past, however, untimely imports and sales of food aid, along with poor targeting, often undermined market development. Food aid and other safety net programs can support long-run market development by:

- Converting from food to cash transfers where food markets already function reasonably well
- Scaling up local and regional procurement of food aid, perhaps including the maintenance of a small and well-managed emergency reserve, but ensuring that the timing of food aid procurement does not aggravate price instability
- Incorporating rainfall insurance into safety net programs to enhance their ability to trigger timely and better-targeted responses to a drought
- Better targeting of food aid through improved information systems and the use of self-targeting approaches, including "inferior" grains
- Integrating safety nets with market development activities, such as the use of food aid to construct local market infrastructure.

Variable Tariffs

Under certain circumstances, variable tariffs can be used to manage downside price risks to producers from exposure to global markets. To be effective, variable tariffs should be triggered by well-defined rules to reduce political capture and be highly transparent in their operation. Technically, their use also

must be approved by the World Trade Organization (WTO), and indeed a preferable outcome would be for the triggers and monitoring of their implementation to be subject to WTO oversight to maintain maximum transparency.

Technically, variable tariffs could also be used to reduce risks from price spikes in global markets, but tariffs must be high enough initially that they can be lowered when world prices rise sharply. Given that high tariffs on food grains are generally undesirable for both efficiency and equity reasons (most poor households, including rural households, are net food purchasers), variable tariffs are unlikely to be useful for managing world price spikes.

Strategic Reserves

Many countries still maintain publicly owned reserves to reduce food price instability. In a liberalized market economy, the primary reason to maintain such reserves should be a targeted food distribution scheme (if there is one), although in a few cases reserves can be maintained to cope with emergencies, especially in landlocked countries with poor infrastructure. In some cases, reserves may be large enough to influence domestic market prices, and judicious use of these reserves may help reduce the impact of domestic shocks on food prices, especially where there is a large wedge between import and export parity prices. Critical safeguards must be in place, however, to ensure that operations of food reserve agencies do not destabilize markets. These safeguards include arm's-length, "central bank"–type autonomy, highly professional management and analytical capacity, strict rule-based market operations to meet a narrowly defined objective, and tendering of operations, including storage, to the private sector.

THE IMPORTANCE OF LOCAL CIRCUMSTANCES

Returning to the country typology discussed earlier, it is clear that food policy design and approaches to managing food sector risks will vary widely, depending on each country's context. The overall priorities on productivity enhancement and market development are fairly generic; they apply in many contexts. However, quite different strategies will emerge across countries and regions when moving to sequenced reforms, creating space for the private

sector, and addressing specific priorities for managing market risks. The Asian countries, in particular, still have a considerable reform agenda to open space for the private sector. Likewise, the opportunity to apply various market-based risk instruments depends significantly on the extent that a country is exposed to domestic versus global shocks.

ENTRY POINTS FOR THE WORLD BANK

Food market reform and food security remain critical areas for Bank engagement. Interest in these issues is burgeoning in many countries, including those which have not yet embarked seriously on reforms and those which seem stuck halfway through the process. The Bank needs to revamp its analytical work in this critical area, paying particular attention to the following points.

Manage the Policy Dialogue Better

Too often, the Bank's analytical work has proposed broad recommendations on market reforms but paid little attention to how those reforms should be sequenced. The "big bang" approaches generally have not worked, and part of the challenge in moving forward is to be alert for opportunities to move toward second- and even third-best options rather than waiting for the opportunity for full reform. Good analytical work will have to be combined with much more time- and resource-intensive policy dialogue that is attuned to political realities (for example, vested interests). Advice on food grain market reform will be more effective if it seeks wide stakeholder dialogue and pays special attention to transitional and sequencing arrangements that mitigate the negative effects of policy changes on particular groups. The use of Poverty and Social Impact Analyses (PSIAs) to ensure wide buy-in and ownership in this delicate reform process is a step in the right direction and should be scaled up.

Pilot and Evaluate New Market-Based Instruments

The recent move by the Bank's commodity-based risk management group to analyze the applicability of market-based risk management instruments for food staples is providing encouraging results and should be scaled up. However, this work should focus on analytical support and capacity building to facilitate adoption of these instruments by the private sector and to promote the emergence of necessary institutions and intermediaries. Extreme caution should be used in promoting use of these approaches by public food marketing or strategic reserve agencies.

Support Activities at the Regional and Global Levels

This report has highlighted the potential for regional trade as a mechanism to stabilize prices within a region, and this prospect raises a huge agenda for analytical work and policy dialogue to reduce policy and institutional barriers to trade in nearly all regions.

1 Introduction

Food price risks and instability are issues that have dogged food policy debates for decades, with good reason. Unstable prices for important food staples, such as maize, rice, and wheat, can have acute economic, social, and political consequences (Timmer 1995). Highly unstable prices can lead to inefficient agricultural production decisions, especially when markets for credit and risk are poorly developed.[1] The human costs of food price shocks can be disastrous for the poor, because food staples often constitute a large share of poor farmers' incomes and poor consumers' expenditures. Food price instability is a frequent forerunner of macroeconomic shocks and political turmoil, which discourage long-run investment and curtail growth.

Food prices can become extremely unstable and risky as a result of climatic events, world price fluctuations, an inelastic supply-and-demand response in domestic markets, and high transportation costs. In many low-income countries, the potential for food price risks is further increased by weak market infrastructure, a poorly developed private sector, and incomplete or poorly functioning financial and risk markets. A growing concern is that these long-acknowledged sources of instability are being aggravated by less familiar forces. Commodity stocks can buffer price instability, but current world stocks for grains are at historically low levels, and even relatively small swings in exports or imports from large countries such as China could send major shock waves through world grain markets (Mitchell and Le Vallee 2005). Climatic cycles and global climate change may increase developing countries' exposure to droughts, floods, and other extreme climatic events that heighten the risk of severe fluctuations in food production.[2]

Until the 1980s, the traditional policy response to food price instability in developing countries was direct government intervention. Governments orchestrated the purchase and sale of food, controlled food prices, and restricted internal and external trade, usually through grain marketing parastatals. While these interventions may have reduced price instability and risk, in many cases they also imposed major economic costs (Schiff and Valdes 1992). Aside from the high costs that are often observed when public institutions take on marketing functions, direct government intervention is frequently susceptible to rent-seeking and inequitable distribution of benefits.[3] Over time, such interventions have led to changes in domestic price levels (which often fall below border prices), high treasury costs, and large income transfers (often from the poor to the wealthy; see Jayne and Rukuni 1993).

By the 1980s, direct intervention was viewed widely as a major impediment to the growth and development of the food sector in developing countries.[4] Donors and many governments began to promote the reform of food marketing and price policies as a central component of structural adjustment programs. The success of these market reforms in providing positive price incentives to farmers within tolerable bounds of price instability, and the extent to which they have actually opened markets to the private sector, have been the subjects of considerable debate.[5] Even so, it is clear that many countries have implemented food market reforms only partially, and that deeper reforms are seriously constrained by concerns over increased food price instability and risk. A number of countries have reversed the reform process and re-established quasi-governmental programs for procuring, storing, and importing food.[6]

OBJECTIVES OF THE STUDY

The search for appropriate policy responses to food price risk and instability has again become a major and contentious issue. There is no clear consensus regarding how best to deal with problems of food price risk and instability, especially in low-income countries and especially in the context of continued market reform.

For the past several decades, the World Bank's position on food marketing policy has rested on three planks (Meerman 1997): (1) liberalize food markets and reduce direct government purchasing and selling; (2) encourage the development of private-sector marketing services and innovation by investing in public goods, such as marketing infrastructure, market information, and grades and standards systems; and (3) put greater reliance on international and regional trade, rather than government-managed buffer stocks, to even out local imbalances in supply and demand.

Some countries embraced most elements of this approach with success; examples include Mali, Mozambique, Bangladesh, Vietnam, and many countries in Latin America. Governments of most other countries, however, especially in eastern and southern Africa, South Asia, the Middle East, and North Africa, still intervene heavily in food markets. Part of the problem is that the World Bank and others have been ineffective in providing guidance to countries on how to manage the transition from public- to private-market operations. It is often argued that the complete liberalization of markets will expose countries to high risks of price spikes or crashes in critical food markets, with unacceptable human, economic, and political costs.

Commodity price stabilization and risk management have received considerable attention from researchers and policymakers over the years, in both industrial and developing- country contexts. This new study of the food price instability and risk problem in low-income countries investigates the benefits and costs of alternative policy responses and, more particularly, provides guidance on how to make the transition from state-dominated markets to private markets in ways that do not expose producers and consumers to the risk of unacceptable price spikes and collapses.

Five important questions are addressed:

1. What are the sources and magnitudes of food price shocks?
2. What are the magnitudes (actual and potential) of the economic and social costs stemming from food price instability in low-income countries?
3. What is the status of food market reforms, and what can be learned from the experience to date?
4. How can countries sequence reforms in ways that promote efficient market development and protect the interests of the poor?
5. What are appropriate policy responses to food price instability and risk in a liberalized market environment?

This report marshals the "best thinking" globally to outline a framework for analyzing policy responses—conventional and emerging—as well as experiences with policy reform. The report reviews experiences with policy reform across low-income countries of Asia and Africa, including relevant experience from other regions (particularly Latin America, where most countries have implemented extensive reforms). The report draws extensively on contributions from academics and practitioners who shared their knowledge at an international workshop on this subject,[7] and on the broader knowledge base within the World Bank and the wider development community.

Two additional points will clarify the scope of the study. First, the terms "food price instability" and "food price risk" are both used in this report. Food price *instability* refers to any abrupt change in price, irrespective of whether the change is predictable. But price fluctuations can arise from unpredictable shocks as well as from predictable

trends or seasonal patterns. *Risk* is associated only with the unpredictable shocks. Many of the costs stemming from volatile food prices, especially on the producer side, are associated with risk rather than instability per se. However, predictable but extreme price movements can also have significant costs in terms of consumer welfare and macroeconomic instability.

Second, the management of food price risk and instability cannot be separated from the wider issue of food market reforms, and this report necessarily addresses both themes. Price instability, real or perceived, is a critical influence on the pace of reforms and the extent of market liberalization. As demonstrated later in this report, food price instability is to some extent itself a manifestation of the way reforms are implemented. For these reasons, the issues and policies discussed in this report are in many ways broader and more complex than might be expected in a study of food price instability and price stabilization policy.

OUTLINE OF THE REPORT

This report begins by marshaling information for understanding and analyzing the problem of food price risks and instability. From the outset, it is recognized that because the problem is highly specific to a given context, it may be helpful to examine the problem through an analytical framework that attempts to take major differences in local context into account. A typology of countries and also of households is constructed, based on secondary data, to assess potential exposure to different sources of price risk and instability. Information on the nature and extent of food price instability and risk in low-income countries, in terms of both global price and domestic production shocks, is also provided, along with available information on the costs of food price risk and instability.

Next, the report focuses on past and prospective policy responses to the problem. Lessons for future policy dialogues are distilled from a review of experiences with food market reform. Specific policy options are described for managing the transition to private markets, including market-based instruments for managing risk, "quick wins" to foster private market development, and the role of safety nets. The final sections of the report focus on ways of advancing the policy dialogue in this politically sensitive area and present conclusions and recommendations.

2

Toward a Typology for Food Policy Analysis

The sources, size, and consequences of food price risk and instability vary substantially across and within countries. These elements depend on a country's specific situation as well as on the local and household characteristics within that country. Similarly, the appropriate policy response to food price risk and instability will vary across and within countries because of differences in geography, patterns of food production and consumption, and institutional capacity to implement alternative policies. What might be appropriate for rice in Indonesia may not work for maize in Ethiopia, and vice versa.

This chapter provides a framework for identifying populations that face price risks from different sources, mainly from world price instability and domestic supply shocks. It develops a "macrotypology" of low-income countries based on secondary data that indicate the likely degree of a country's exposure to domestic weather shocks and global price shocks. The second part of the chapter develops a typology of households that indicates likely differences in the way that food price instability and risk will affect different types of households. The discussion throughout the chapter recognizes that this framework is only a starting point, and that country and household situations change over time, sometimes quite rapidly.

A MACROTYPOLOGY OF COUNTRIES

Several criteria are used to classify countries in terms of their exposure to global and domestic sources of food price shocks. Income level is the first criterion: Low-income countries are most likely to be affected by price shocks because of the high share of food staples in national income, and because they have less means to cope with shocks. Twenty-five low-income countries (income status was based on the World Bank Atlas method of classification)[8] with a population of more than 10 million were selected for analysis. For comparison, four lower-middle-income and two upper-middle-income countries were included.

The dominant food staple within each country was identified from Food and Agricultural Organization (FAO) food balance sheets for 2002 (table 2.1). In some countries, no single food staple dominated, so two important food staples were included. Secondary data sources, mainly from FAOSTAT, were used to further classify countries according to several criteria.

Table 2.1 Countries, Income Status, and Dominant Staples Based on Calorie Intake

Country	Country Code	Dominant Staple	Income Status	Dominant Staple, 2002
Bangladesh	Ban	Rice	L	1,631
Burkina Faso	Buf	Millet/Sorghum	L	1,265
Cambodia	Cam	Rice	L	1,420
Cameroon	Cmr	Maize	L	418
		Cassava	L	279
Chile	Chi	Wheat	UM	909
Cote d'Ivoire	Clv	Rice	L	577
Egypt, Arab Rep.	Egt	Wheat	LM	1,093
		Maize	LM	594
Ethiopia	Eth	Maize	L	396
		Wheat	L	302
Ghana	Gha	Cassava	L	635
		Maize	L	364
India	Ind	Rice	L	827
		Wheat	L	498
Indonesia	Ina	Rice	LM	1,465
Kenya	Ken	Maize	L	714
Madagascar	Mas	Rice	L	973
Malawi	Mlw	Maize	L	1,126
Mali	Mal	Millet/Sorghum	L	781
Mexico	Mex	Maize	UM	1,057
Morocco	Mor	Wheat	LM	1,343
Mozambique	Moz	Cassava	L	719
		Maize	L	534
Nepal	Nep	Rice	L	941
Niger	Ngr	Millet/Sorghum	L	1,424
Nigeria	Nia	Millet/Sorghum	L	646
Pakistan	Pak	Wheat	L	999
Senegal	Sen	Rice	L	746
South Africa	S.Af	Maize	LM	936
Sudan	Sud	Millet/Sorghum	L	737
Tanzania	Tan	Maize	L	657
Uganda	Uga	Plantains	L	447
		Cassava	L	307
		Maize	L	260
Vietnam	Vtm	Rice	L	1,662
Yemen, Rep.	Yem	Wheat	L	912
Zambia	Zam	Maize	L	1,088
Zimbabwe	Zim	Maize	L	705

Source: Authors

Note: L = low income, UM = upper middle income, LM = lower middle income.

Diversity in Domestic Food Consumption

The extent to which consumption is concentrated on one staple food commodity is probably the single most important variable influencing vulnerability as well as political sensitivity to unstable food prices. When consumption is highly concentrated on one staple, the implication is that the staple makes up a large share of consumer expenditures.

Upward price spikes can severely jeopardize the welfare of low-income consumers.

Of course, much depends on the degree to which one commodity can be substituted for another. From a policy perspective, fluctuations in supplies and prices in one market can be partially absorbed by other markets, to the extent that consumer demand is flexible enough to shift to substitute foods when the price of one food staple rises. In most

cases, there is scope for substitution between the selected commodities, but it is far from perfect. For example, in Africa millet and sorghum are very close substitutes and have been grouped into one commodity for this analysis. However, the dominance of rice in Indonesian and Bangladeshi consumption patterns and the very limited potential to shift to other staples restrict the potential for using trade in other staples as a strategy to moderate variability in rice prices. Even within commodities, strong preferences often emerge for particular varieties or grain types, such as the preference for white maize over yellow maize, with the result that commodity-specific data can hide cases of imperfect within-commodity substitution.

The dominance of one commodity is calculated using the Herfindahl-Hirschman Index, which is commonly used to measure the market share or, in this case, the share S_i of calories from different starchy food staples in each country. The index, $HHI = \Sigma(S_i)^2$, is 1 if only one staple is consumed, and zero for an infinitely diverse consumption basket. The index is summarized in figure 2.1, and individual data are given in appendix 1.

The countries that tend to concentrate most on one staple are the rice economies of Southeast Asia, but some countries are also highly dependent on wheat (Pakistan, Morocco, Yemen, and Chile), maize (Mexico and the countries of southern Africa), and millet/sorghum (Burkina Faso, Mali, and Niger). Countries in which cassava is a major staple, and coastal countries of West and Central Africa, generally have the most diverse food consumption baskets, with diversity indices of 0.25 or less.

Dependence on Trade and Access to Global Markets

From the perspective of food price policy, one of the most important characteristics of a country is whether it consistently imports, exports, or fluctuates between importing and exporting its major food staple. If a country is a consistent food importer and its markets function reasonably well, domestic prices should move in line with import parity prices. Similarly, if a country is a consistent exporter, then domestic prices should move in line with export parity prices. In both cases, domestic price instability will be determined largely by global price shocks. But when a country fluctuates periodically between import and export status or a commodity is not tradable (for example, cassava), domestic shocks from

Figure 2.1 Diversity of Staple Consumption, 2002
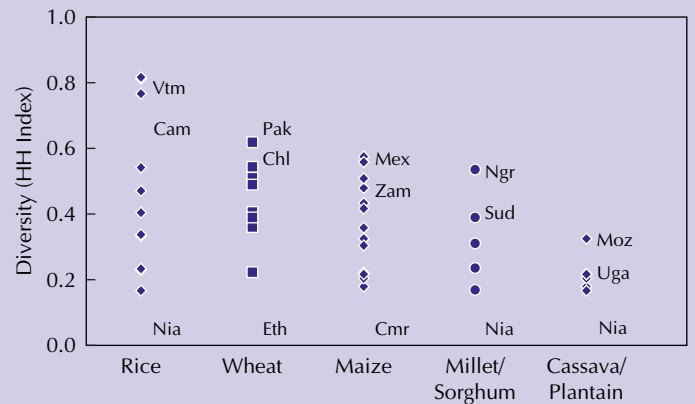
Note: Country abbreviations are listed in table 2.1.
Source: Authors.

climatic events will dominate the sources of price instability. This predominance is especially marked in landlocked countries or in large countries with very poor infrastructure, where there is a wide wedge between import and export parity prices (Byerlee and Morris 1993). In landlocked Zambia, for example, export and import parity prices for white maize can differ by US$150 per ton—more than the normal CIF port price of maize. Likewise in another landlocked country, Ethiopia, the elasticity of price transmission between global cereal prices and prices in the capital, Addis Ababa, is estimated to be 0.8, but it falls to less than 0.2 for many of the more remote producing regions (Nicita 2005).

These differences in tradability were captured in three variables: (1) the consistency of trade status, measured by the number of years in the past 10 years that a country has imported or exported; (2) the dependence on imports as a percentage of utilization; and (3) coastal versus landlocked status.[9] The results by commodity and country (figures 2.2 and 2.3) reveal very strong differences in tradable status.

Rice is universally traded, and all the countries in which rice is a staple food are exposed to global price shocks, mostly as regular importers or, in the case of India and Vietnam, as exporters. Wheat is also highly traded (in this case all countries are net importers). Countries in West Africa where rice is important, and in the Middle East and North Africa where wheat is important, also import a relatively high share of their consumption.

Figure 2.2 Trade Status of Dominant Staple Commodities, 1994–2003
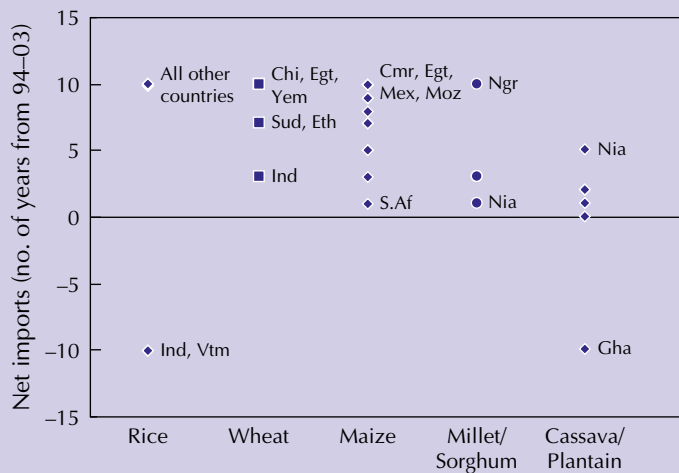
Note: Country abbreviations are listed in table 2.1.
Source: Authors.

At the other extreme, millet/sorghum and cassava are rarely officially traded, and some African countries engage very little in trading maize, either because they are self-sufficient in most years or because high transport costs impede trade, especially in landlocked countries such as Ethiopia. For maize in Africa, the trend over the past decade has been for countries such as Zambia, Malawi, and Kenya to become importers with increasing regularity, although in years of good rainfall, the combination

Figure 2.3 Import Share of Staple Food Utilization, 1994–2003

Note: Country abbreviations are listed in table 2.1.
Source: Authors.

of surplus production and high transport costs can cause supply gluts and depressed food prices. Finally, it should be noted that the middle-income countries included in the sample are relatively more dependent on trade to supply staple food needs (often one-quarter or more of total needs).

Capacity to Meet Food Import Requirements on Commercial Terms

For a country that must consistently import its primary food staple, the impact of either domestic or global price shocks depends in part on its capacity to import additional food from world markets. This capacity was measured by the value of food imports as a share of foreign exchange reserves (figure 2.4).[10] Nearly all of the countries with the lowest capacity to import are in Africa, although Bangladesh and Yemen would use one-quarter or more of their foreign exchange reserves just to meet their average annual cereal imports. Based on these criteria, Ethiopia, Malawi, Sudan, and Yemen are highly exposed to price shocks.

Given their weak capacity to import food commercially, many low-income countries depend on food aid to meet food supply gaps. This is especially so in Africa, where several countries depend on food aid for 10–15 percent of consumption. Although food aid reduces demands on foreign exchange and may help overcome domestic food shortfalls, dependence on food aid may weaken a country's ability to manage world price shocks, and the management of local food aid procurement and release may exacerbate domestic price instability (box 2.1).

A final issue in assessing vulnerability in exposure to trade is the availability of the required grains on world markets and the size of a country's imports in relation to world market volumes. The widespread intervention in domestic rice markets in Asia from the 1960s was founded on the belief that world rice markets were too thin to rely on imports to manage domestic shocks. However, Rashid, Cummings, and Gulati (2005) show that rice markets have become more robust over time and that all but a few of the largest rice-consuming countries could participate in rice markets without influencing prices. A similar situation has occurred in Africa for white maize. Almost all maize traded outside the region was yellow maize, but this situation has changed in recent years (box 2.2). For nearly all of the countries in this sample, trade in
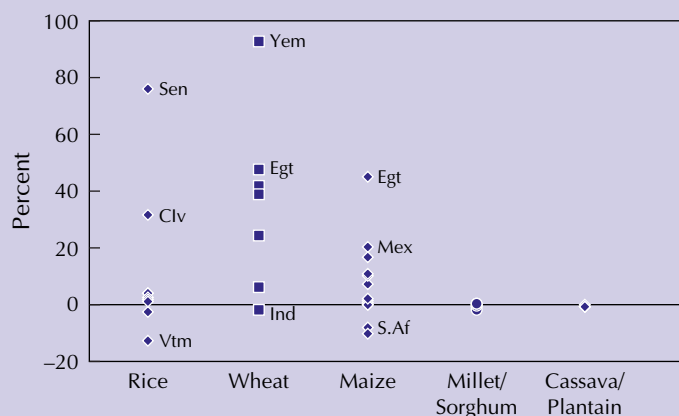
staple food commodities is not large enough to in-
fluence world market conditions, so this consider-
ation is not discussed further, although it might be
important in a few cases, such as rice in Indonesia
and white maize in South Africa.

Variability in Domestic Food Production

When domestic events, such as bad weather, cause
prices for nontradable commodities to soar, the
magnitude of these shocks will be closely related to
the variability of domestic production. Many fac-
tors are responsible for variability in production,
but two dominate. The first is the size of a country.
Larger countries typically have more diverse re-
gional climatic conditions that reduce risks for the
country as a whole. The second is drought. The
magnitude of drought shocks depends on the level
of rainfall and on whether irrigation is available.

Production variability around trend was sum-
marized for each country/commodity combination
using the Cuddy–Della Valle Index (CLVI):

$$CLVI = CV(1 - R^2)^{0.5},$$

where CV is the unadjusted coefficient of variation
over 1994–2003 and R^2 is the coefficient of determi-
nation for the log-linear time trend regression over
the same period (Cuddy and Della Valle 1978).

Because Asian countries are large and a major
share of food crop production occurs under irriga-
tion, the magnitude of production variability is gen-
erally low, on the order of 2–7 percent (figure 2.5).

**Figure 2.4 Value of Average Annual Cereal Imports as
a Share of Foreign Exchange Reserves,
1994–2003**
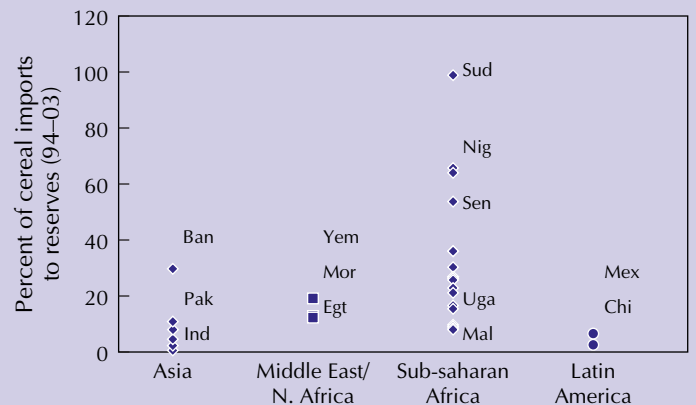
Note: Country abbreviations are listed in table 2.1.
Source: Authors.

Singh and Byerlee (1990) show a significant nega-
tive relationship across countries between the CV of
national wheat yields and both (1) the percentage
wheat area under irrigation and (2) the total area of
wheat cultivated in a country. By contrast the CLVI
for African maize, rice, wheat, and millet/sorghum
generally exceeds 15 percent. It surpasses 20 per-
cent in southern Africa, partly because of the re-
gion's dependence on rain-fed rather than irrigated
agriculture rainfall, and partly because country
sizes are small and regional trade potential is not
well developed.[11]

Box 2.1 Reliance on Food Aid Can Intensify Food Price Shocks

Several African countries are relatively dependent on
food aid (appendix 2). This dependence poses two
dilemmas in managing food price shocks. First, inter-
national supplies of food aid are negatively correlated
with world grain prices. In other words, when world
prices increase sharply, the availability of food aid de-
creases. The burden on foreign exchange increases,
because countries may have to increase commercial
food imports to offset food aid shortfalls just when the
price of commercial imports is high. The elasticity of
foreign exchange requirements for grain imports with

respect to world grain prices may therefore be consid-
erably higher than one for countries that depend on
food aid [Taylor and Byerlee (1991)]. Second, the un-
timely release of food aid into local markets or—in
countries where food aid is procured locally—the un-
timely procurement of grain can contribute to price in-
stability in local markets. For example, in Ethiopia,
more food aid is procured just before harvest when
prices are highest, further increasing seasonal price
swings (World Bank, Forthcoming).

Source: Taylor and Byerlee (1991); Barrett and Maxwell (2005); World Bank (Forthcoming).

Box 2.2 A Growing White Maize Market Challenges the Rationale For Stockholding

Until recently, the world market for white maize was thinly traded, so small absolute changes in import demand in southern Africa had the potential to influence world prices. The rationale for some level of stockholding is more compelling in such cases. As a result of the North American Free Trade Agreement (NAFTA), however, the white maize market has become much more heavily traded. Since 1997, NAFTA has induced a

large white maize supply response in the United States to export to Mexico. These developments have mitigated the potential for white maize prices and supplies to become tight when southern Africa experiences a drought and have thus reduced the rationale for keeping large government stockpiles of white maize to stabilize supplies [Tschirley and others (2004)].

Estimated World Exports of White Maize (000 Tons)

	1976–1980 Average	1981–1985 Average	1986–1990 Average	1991–1997 Average	1998–2003 Average
South Africa	621	888	972	1132	621
United States	156	126	272	505	1,254
World total	1,197	1,579	1,930	Na	Na

Source: Tschirley and others (2004).

Combining Criteria into a Country Typology

When the criteria discussed previously are combined and countries are grouped according to their median levels for major variables, two classifications emerge. The first (table 2.2) identifies countries that appear to be especially vulnerable to global price shocks. The second (table 2.3) identifies

countries that appear to be especially vulnerable to domestic production shocks.

In each table, the first-level division (see the first column) is based on the dietary concentration of consumption of starchy food staples.[12] The idea is that higher dietary concentration leaves consumers more exposed to price shocks in dominant commodities, regardless of the source of the shocks. The second-level division (see the first row) is based on the country's trade status with respect to the commodity, as measured by the consistency of imports (or exports). In this case, the median value is 10, so countries are divided into those that have imported (or exported) in each of the last 10 years and those that have not. Many of the latter have been importers in most years, so the share of consumption provided by imports is reported in parentheses within the body of the table. Countries are further classified into coastal and landlocked as an additional measure of potential tradability and transportation costs.

Table 2.2 groups countries according to their exposure to global markets and, hence, world price shocks. A further division in this table relates to countries' capacity to import, measured by food staple imports as a share of foreign exchange reserves. Country-commodity combinations in the top left corner of the table are therefore the most exposed to

Figure 2.5 Cuddy–Della Valle Index of Production Variability for Staples, 1995–2004
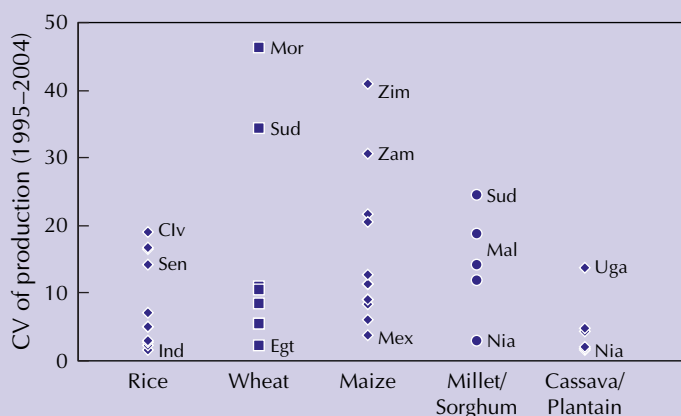
Note: Country abbreviations are listed in table 2.1.
Source: Authors.

Table 2.2 Typology of Countries According to Exposure to Global Price Shocks

Diversity of Food Staple Consumption	Ratio of Cereal Imports to Foreign Reserves	Exposure to Global Markets (net importer in all 10 years)			
		Yes		**No**	
		Coastal	**Landlocked**	**Coastal**	**Landlocked**
High staple concentration (HHI >= 0.43)	**Higher import to reserves ratio (≥ median 19%)**	Yemen–Wh (93.0) Bangladesh–Ri (2.5) Madagascar–Ri (4.9)	Niger–M/S (0.47)	Kenya–Mz (9.5)	*Zambia–Mz (10.5) Malawi–Mz(6.9) Zimbabwe–Mz(–8.7)*
	Lower import to reserves ratio (< median).	Vietnam–Ri (–12.5) Morocco*–Wh (41.8) Cambodia–Ri (1.5) Chile*–Wh (24.5) Mexico*–Mz (20.1) Indonesia*–Ri (3.7)		Pakistan–Wh (6.5)	
Low staple concentration (HHI >= 0.43)	**Higher import to reserves ratio (≥ median 19%)**	Senegal–Ri (75.8) Côte d'Ivoire–Ri(32.0) Cameroon–Mz (0.8) Ghana–Ca (–0.2)	*Ethiopia–Wh (39.2)*	Sudan–M/S (–1.8) Ghana–Mz (–0.1) Cameroon–Ca(–0.0)	Ethiopia*–Mz (0.7) Burkina Faso–M/S (–0.1)
	Lower import to reserves ratio (<median).	*India–Ri (–2.4)* Mozambique–Mz (16.4) Egypt*–Wh (47.4) Egypt*–Mz (38.7)	*Nepal–Ri (1.3)*	Nigeria–S/M (–0.1) *India–Wh (–1.8)* South Africa*–Mz(–10.8) Mozambique–Ca(0.0) Tanzania–Mz (1.8)	*Uganda–Ca (0.0) Uganda–Pl (0.0) Mali–M/S (–0.3)*

Note: HHI is the Herfindahl-Hirschman Index = $\Sigma(S_i)^2$, where S_i is the share of calories from starchy food staple *i.* Staple foods are Ca = cassava, Mz = maize, M/S = millet/sorghum, Pl = plantain, Ri = rice, and Wh = wheat. Numbers in parentheses indicate the percentage of utilization imported for dominant staple, 1995–2004. Countries in italics have food aid greater than 50 percent of cereal imports, 1999–2004. Countries marked with an asterisk (*) are classified as middle income, based on the World Bank Atlas method (see footnote 9). Shaded countries are most exposed to global shocks.

Source: Authors.

global markets—the commodities are dominant, they are consistently traded, and the share of consumption that is traded is relatively high, especially in relation to foreign exchange reserves. Three countries—the Republic of Yemen (wheat), Bangladesh (rice), and Madagascar (rice)—are especially vulnerable to global price shocks, based on the amount and consistency of imports in relation to foreign exchange reserves. Kenya, Malawi, and Zambia imported maize in 7 to 9 of the last 10 years, so they could also be included in this group. However, these countries also received a large share of their imports as food aid, although food aid does not necessarily reduce their exposure to spikes in world prices (box 2.1). A number of Asian and middle-income countries (such as Morocco, Cambodia, Mexico, and Indonesia) are also exposed to global price

shocks, but food imports are a smaller share of total exports and foreign exchange reserves, so these countries are less vulnerable.

The bottom right corner of table 2.2 lists country-commodity combinations that would be least exposed to world price shocks. These combinations include many of the cases—all in Africa—in which millet/sorghum and cassava are major staples, because these staples are largely nontradable. Several African countries that depend on maize are also in this group. In contrast, very few examples of rice- or wheat-dominant countries have relatively low exposure to world price shocks, which is to be expected, because rice and wheat are the most tradable staple commodities.

Table 2.3 displays country-commodity combinations according to their potential vulnerability to

Table 2.3 Typology of Countries According to Exposure to Domestic Price Shocks

Diversity of Food Crops	CLVI for Dominant Staple Production	Exposure to Global Markets (for all 10 years)			
		Yes		No	
		Coastal	Landlocked	Coastal	Landlocked
High staple concentration (HHI >= 0.43)	**High variability in staple production** (≥ median 8.9%)	Morocco*–Wh (41.8) Yemen–Wh (93.0) Chile*–Wh (24.5)	Niger–M/S (0.5)	Kenya–Mz (9.5)	Zambia–Mz (10.5) Zimbabwe–Mz(–8.7) Malawi–Mz (6.7)
	Low variability in staple production (< 8.9%)	Bangladesh–Ri (2.5) Cambodia–Ri (1.5) Indonesia*–Ri (3.7) Madagascar–Ri (4.0) Mexico*–Mz (20.1) Vietnam–Ri (–12.5)		Pakistan–Wh (6.5) Tanzania–Mz (1.8) Ghana–Mz (–0.1) South Africa*–Mz (–10. 8) Sudan–M/S (–1.8)	
Low staple concentration (HHI < 0.43)	**High variability in staple production** (≥ median 8.9%)	Mozambique–Mz (16.4) Senegal–Ri (75.8) Egypt*–Mz (38.7) Côte d'Ivoire–Ri(32.0)		Nigeria–M/S (–0.1) India–Wh (–1.8) Cameroon–Ca(–0.0) Mozambique–Ca(0.0)	Mali–M/S (0.3) Burkina Faso–M/S (–0.1) Uganda–Ca (0.0) Ethiopia–Mz (0.7)
	Low variability in staple production (< 8.9%)	Cameroon–Mz (0.8) Egypt*–Wh (47.4) India–Ri (–2.4) Ghana–Ca (–0.2)	Nepal–Ri (1.3) Ethiopia–Wh (39.2)		Uganda–Pl (0.0)

Source: Authors.

Note: CLVI is a measure of production variability (see section 2.1.4). HHI is the Herfindahl-Hirschman Index = $\sum(S_i)^2$, where S_i is the share of calories from starchy food staple *i*. Staple foods are Ca = cassava, Mz = maize, M/S = millet/sorghum, Pl = plantain, Ri = rice, and Wh = wheat. Numbers in parentheses indicate the percentage of utilization imported for dominant staple, 1995–2004. Countries in italics have food aid greater than 50 percent of cereal imports, 1999–2004. Countries marked with an asterisk (*) are classified as middle income, based on the World Bank Atlas method (see footnote 9). Shaded countries are most exposed to global shocks.

domestic price shocks; the subgroupings reflect the extent of domestic production variability. The right side of the table displays the country-commodity combinations that are most exposed to domestic shocks because these countries participate less in trade. The country-commodity combinations in the top right corner are most vulnerable, notably the African countries that depend mostly on maize and have highly variable production. All of these countries import in most years, however, and trade is an increasingly viable option. Another grouping includes millet/sorghum in Niger, Mali, and Burkina Faso and maize in several other African countries where production variability is high. The countries in this group are largely self-sufficient, however, and prices could swing widely between export and import parity. This group is characterized by high vari-

ability in production and low participation in trade, although the staple is usually less dominant.

Although there are many other ways to group countries, some instructive patterns emerge from the classification used here. In summary, the rice- and wheat-consuming countries of Asia have the most stable production and depend on global markets for only a small share of consumption. They are exposed to global shocks but should have the capacity to manage them, because only a small change in domestic production or consumption is needed to clear markets in response to a price shock. On the other hand, African producers and consumers of maize and millet/sorghum are relatively exposed to domestic production shocks caused by high production variability. In many cases, limited participation in trade will magnify the impacts of these

shocks, although some countries will not suffer as much because local diets are more diversified. Still other countries, notably the southern African countries and Kenya, depend heavily on maize but participate extensively in trade. Their capacity to import is quite limited, however, owing to constraints on export earnings and foreign exchange, and food aid is used to fill the gap. These countries are especially vulnerable to shocks that affect the region as a whole, because they have to pay higher import prices when severe drought leads to regional shortfalls. Finally, it is important to note that these classifications can change quite rapidly, as seen over the past 30 years in Asia, where constraints on developing efficient food markets and food imports have been dramatically reduced (box 2.3).

A MICROTYPOLOGY OF HOUSEHOLDS

Important differences and trends at the household level affect the nature and costs of price instability at the microlevel. Household surveys provide important data on emerging "empirical regularities" surrounding food production, consumption, and trade in low-income countries.

Rural Household Participation in Markets

A widespread misconception is that high grain prices benefit the rural population at the expense of the urban population, because rural households are equated with farm households and farmers are equated with the production and sale of food. In fact, rural households participate in grain markets in widely varying ways, and the overwhelming evidence is that now the majority of the rural population, and especially poor households, are net purchasers of grain. Small-scale farm households generally fall into one of four categories with respect to their participation in major staple grain markets (tables 2.4 and 2.5).

Households that sell staple grains account for roughly 20–35 percent (40 percent in Vietnam) of the rural farm population. In Eastern and southern Africa, two subgroups fall within this category:

- A very small group (about 2–4 percent of the total rural farm population) of relatively wealthy smallholder farmers with 5–15 hectares of land, who sell between 5 and 50 tons of grain per farm annually and account for half of marketed output
- A larger group of farm households (20–30 percent of the total rural farm population) selling much smaller quantities of grain (between 0.5 and 5 tons per farm), who tend to be slightly better off than households that buy grain (see below).

Households that buy staple grains generally make up 60–70 percent of the rural population (their

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Box 2.3 Major Changes in Asia's Food Policy Environment

Over the past 30 years, food markets in Asia have become more integrated and efficient, reflecting dramatic changes on several fronts. The table below provides evidence of changes in foreign exchange earnings and the ability to import cereals, improve-ments in infrastructure, and adoption of improved crop production technology in major Asian countries. Production variability has also declined significantly in response to these changes [Naylor, Falcon, and Zavaleta (1977); Singh and Byerlee (1990)].

Year	Import Capacity Index	Cereal Imports as Percentage of Foreign Reserves	Paved Roads (000 km)	Percentage of Arable Area Irrigated	Percentage of Rice Area Planted to Modern Varieties	Percentage of Wheat Area Planted to Modern Varieties
1970	25	56	78	27	32	27
2000	143	5	293	45	79	95

Note: Countries include Bangladesh, India, Indonesia, Pakistan, the Philippines, and Vietnam. The import capacity index measures the ability of current foreign exchange reserves to import a given quantity of cereals.

Source: Rashid, Cummings, and Gulati (2005).

Table 2.4 Distribution of Farm Households According to Participation in the Staple Grain Market, Africa (% of total)

Household Category with Respect to Main Staple Grain	Zambia (maize)	Mozambique (maize)	Kenya (maize)	Ethiopia (maize and teff)
Sellers only	19	13	11	13
Buyers only	33	51	58	60
Buy and sell (net buyers)	3	12[a]	7	13
Buy and sell (net sellers)	5		16	12
Neither buy nor sell	39	24	8	2
All	**100**	**100**	**100**	**100**
Top 50% of total sales	3	3	2	2
Bottom 50% of total sales	21	10	9	11

[a] The Mozambique data do not allow net buyers and net sellers to be distinguish among households who both buy and sell

Source: Jayne, Tembo, and Nijhoff 2005, based on data from Zambia: Central Statistical Office Supplement to the Post Harvest Survey, 2000/01 marketing year; Kenya: Tegemeo Institute Household Survey, Egerton University, 1999/2000 season; Mozambique: Trabalho do Inquerto Agricola (TIA), Ministry of Agriculture and Rural Development (MADER), and National Institute of Statistics (INE), 2001/02 season; and Ethiopia: Central Statistical Authority, Government of Ethiopia, Food Security Survey, 1995/96 season.

number is higher in drought years and lower in good years). They are generally poorer and have smaller farm sizes and asset holdings than the median rural household.

Households that both buy and sell staple grains within the same year generally make up 5–15 per-

Table 2.5 Distribution of Rural Households in Indonesia, Vietnam, and Mexico According to Participation in the Staple Grain Market (% of total)

	Indonesia (rice)	Vietnam (rice)	Mexico (maize)
Producers who are net sellers	29	43	25
Producers who are net buyers	10	41	45
Nonproducers	61	16	30
Total	**100**	**100**	**100**

Source: Indonesia: Dawe and Timmer 2005; Vietnam: Ryan 1999; and Mexico: Avalos-Sartorio (personal communication).

cent of the rural population. This group comprises relatively wealthy households that sell grain and buy back lesser amounts of processed meal, as well as relatively poor households that make distress sales of grain after harvest only to buy grain later in the season (typically less than 5 percent of the total).

Households that neither buy nor sell staple grains make up a small proportion of the rural population in countries where one staple crop dominates. However, in countries where cassava is the main staple in specific and usually very remote regions, such as northern Zambia and parts of Mozambique, a sizable fraction of the rural population is autarkic with respect to the primary national food crop (maize).

According to their status as sellers and purchasers of food grains, different types of households will be impacted quite differently by price instability and may be quite sensitive to whether it is seasonal or interannual (table 2.6).

Several implications can be drawn from this typology of rural households:

1. Staple grain sales are highly concentrated among a relatively small proportion of the rural farm population. These households will be hurt most when prices of food staples collapse, but they are also in a much better position to weather such shocks, because their income and asset levels are much higher than the national average.[13] Also, because production and sales tend to be relatively high in years when prices are low (and vice versa), the instability in grain sellers' revenue over time is likely to be lower than instability in prices.

2. The majority and the poorest segment of farm households are grain purchasers and are most vulnerable to rising prices (which also reduce the cash available for purchasing farm inputs). Because these households rarely sell the main staple crop, even in a good year, they do not face output price risk, and downward swings in grain prices have little effect on production incentives.

3. While an inverse relationship between prices and quantities marketed may dampen the effects of price shocks on farm incomes, this is not true for farm households that are (a) chronic food purchasers in normal and poor rainfall years or (b) self-sufficient in normal years but transitory food buyers in bad years. For both groups of households, higher grain prices exacerbate the weather shock, because grain must be purchased for consumption.

Table 2.6 Who Is Affected by Food Price Instability, and How?

Type of Household	Price Instability Problem	Relative Importance of Inter-annual or Intra-annual Price Variability
1. Poor consumers	High prices reduce real incomes, especially in years of low harvest	Peaks in both
2. Net deficit producers	As in 1, but high prices also discourage investment in high-value crops	Peaks in both
3. Net deficit sellers	As in 2, but low prices immediately after harvest reduce real income	Intra-annual troughs
4. Surplus producers	Price collapse at bumper harvest reduces real incomes and depresses incentives for investment in intensification	Both, particularly intra-annual troughs

Source: Poulton et al. 2005

4. Attempts by food-purchasing farm households to diversify into higher-valued crops depend on their confidence in being able to procure food at tolerable prices. Price instability can act as a disincentive to diversify to cropping patterns that raise farmers' incomes but increase their risks in food markets (Fafchamps 1992).

5. Food policies that alter mean price levels over time (for example, relative to border prices) can have unanticipated income distributional effects that run counter to explicit poverty reduction goals. To the extent that the poor are net purchasers of staples, they are directly hurt by policies that raise the prices of these commodities. The benefits of food policies that raise food prices are captured predominantly by the small minority of wealthier households that sell most of the staple grains. This situation is evident for maize in Kenya and rice in Indonesia and Madagascar, where substantial import tariffs are in place.

A Reduced Role for Food Staples

Household data also reveal important trends over time. In particular, the dominance of food staples as a share of producer incomes and consumer expenditures is shrinking, so extreme movements in the prices of the major food staple now have much smaller effects. For example, in eastern and southern Africa, the dominant staple—white maize—now generally accounts for 10 percent or less of producer cash revenues from agriculture or consumer expenditures (table 2.7). Gradually shrinking landholdings over the past decades have caused farmers to shift toward crops that provide greater caloric value per unit of land. The elimination of pan-territorial pricing on maize in some countries has also diversified cultivation patterns. In Zambia, the value of cassava and sweet potato production is now roughly 75–85 percent of the value of maize production (Govereh, Jayne, and Shaffer, forthcoming).

The rapid rise in wheat and rice consumption in urban areas of Africa has moderated the effects of variability in coarse grain prices in many of those areas. Data from recent surveys in urban Kenya indicate that expenditures on wheat now exceed those on white maize, the traditional staple. The share of expenditure on maize is less than 10 percent in urban areas (Traub and Jayne 2004; Muyanga and others 2005). More diverse diets, particularly in urban areas, make it easier for households to stabilize their food expenditures through substitution. Low-income groups remain susceptible to sharp increases in cereal prices, however, because staple food still accounts for 30–40 percent of consumer expenditures (tables 2.7 and 2.8).

MAIN MESSAGES FOR THE DESIGN OF FOOD SECURITY POLICIES

All food security policies—but especially policies directed at managing food price risks and instability—must be designed in accordance with the macro- and microlevel conditions prevailing in a particular

Table 2.7 The Role of White Maize in Farm Incomes and Consumer Expenditures, Eastern and Southern Africa

Country	Value of Maize Output as Percentage of Total Farm Output	Cash Revenue from Maize as Percentage of Cash Revenue from Agriculture	Expenditure on Maize Products as Percentage of Urban Household Income
Kenya	19	10	1 to 10
South Africa[a]	na	na	1 to 7
Mozambique	27[b]	6	Na
Zambia	45[b]	16	15

Note: na = information not available.

[a] Study sample pertains to urban and peri-urban region outside Umtata, Eastern Cape Province, 2004.

[b] Does not include fruits, vegetables, or livestock products in total farm output.

Source: Kenya: Muyanga et al. 2005; Tegemeo Institute Rural Household Survey, 1999/00 crop season; South Africa: Traub and Jayne 2004; Mozambique: Ministry of Agriculture and Rural Development (MADER), in collaboration with the National Institute of Statistics (INE), Trabalho do Inquerito Agricola (TIA), 2002; Zambia: Post Harvest Survey, 1999/00, and Supplemental Survey to the PHS, 2000; Ministry of Agriculture and Central Statistical Office, Government of Zambia; and del Ninno, Dorosh, and Subbarao 2005.

country. The typology of countries constructed in this section reveals very large differences in potential exposure to global price shocks and domestic production shocks. In general, the Asian economies face the least risk, although their dependence on one commodity (rice) may exacerbate risks to some extent. The potential for risks from domestic shocks is far higher in the maize- and millet/sorghum-dominated economies of Africa, where the capacity to manage these risks is constrained by levels of foreign reserves and export earnings.

At the microlevel, food policy must distinguish between myth and reality. The notion of smallholder subsistence farmers who produce a surplus for the market in good years is largely a myth. The reality is that the majority of poor farmers and other rural households depend increasingly on the market to meet their staple food needs in most years.

Finally, food policy must take account of rapidly changing production and consumption patterns. Many parameters of food security policy that reigned in the 1970s and 1980s, especially food self-sufficiency and price stabilization, are outdated. Indeed, in terms of household welfare, producer revenue from the sale of a major staple food is often less than 20 percent in many parts of Asia and Africa. Similarly, consumers' expenditures on a major staple food now occupy a surprisingly low share of total household expenditures in many low-income countries.

Table 2.8. Household Food Budget Shares (%) in Rural and Urban Areas

	Zambia, 1998			Ethiopia, 2000			Bangladesh, 2000	
	Maize	All Cereals	Food Share	Maize	All Cereals	Food Share	Rice	All Grains
Rural (bottom 30%)	27	44	77	13	43	85	53[a]	55[a]
Rural (average)	21	33	74	10	34	71	42	45
Urban (bottom 30%)	28	34	69	4	33	65	43[a]	46[a]
Urban (total)	15	22	59	2	20	46	29	33

[a] Bottom 20%.

Source: del Ninno, Dorosh, and Subbarao 2005

3

The Nature and Extent of Food Price Instability and Risk

How great is the problem of food price instability in low-income countries, and why does food price instability vary across countries? Although government policy has a critical role in reducing or adding to food price instability, particularly as it relates to whether market liberalization policies have improved or worsened the variability in food prices, detailed discussion of this issue is deferred to a later discussion. This chapter examines the magnitude of two major exogenous sources of food price instability—world price shocks and domestic supply shocks (primarily induced by climate or natural disasters)—and how they are transmitted to domestic food prices. It also briefly examines whether price shocks are likely to become more severe or frequent in the future.

VARIABILITY IN WORLD GRAIN PRICES

As noted in chapter 2, the three major grains traded internationally for food use are rice, wheat, and white maize. Prices of these grains tend to move quite closely together, indicating that to some extent they are substitutes in world markets (although this is somewhat less true for white maize). In general (a) world prices of all the major grains have been declining in real terms, (b) there is no statistical evidence that these prices are becoming more variable over time, and (c) in the case of rice, world prices appear to have become more stable over time (table 3.1).[14]

There is no evidence of any recent increase in world price variability for grains, but the absolute levels of variability are high. The coefficients of variation (CVs) are 33 percent for rice, 29 percent for wheat, and 23 percent for yellow maize (probably higher for white maize).[15] If fully transmitted to domestic markets in low-income countries, such high levels of price variability could pose problems for farmers and poor consumers.

Another important dimension of food price variability is the persistence of world price shocks. If shocks dissipate quickly, the effects of price instability are less pronounced, because over time producers and consumers come to understand the temporary nature of the instability and adjust their behavior accordingly. But if shocks are persistent and move prices away from their long-run trend levels for an extended period, then instability has more lasting effects that require greater (and more painful) adjustments. Sarris (1998, 2000) finds relatively low persistence in world cereal prices, and these results are sup-

Table 3.1 Variability in World Prices of Major Grains, 1971-2003			
	Rice	Wheat	Yellow Maize
Coefficient of variation (CV) 1971–2003 (%)	33	29	23
Regression t-statistic for:			
Price trend	–7.5	–7.2	–9.7
5-year moving standard deviation	–7.5	–4.6	–4.5
5-year moving CV	–4.5	0.0	–0.2

Note: All regressions are linear trends over the period 1971–2003. The CV is the standard deviation of detrended price divided by mean of actual (not detrended) price.

Source: Hazell, Shields, and Shields 2005.

ported by Leon and Soto (1997). It appears that price shocks for rice do persist for lengthy periods of 9–18 years, however, implying that at least some major grain prices can cycle away from their long-run trend for extended periods (Cashin, Liang, and McDermott 1999).

PRICE VARIABILITY IN DOMESTIC FOOD MARKETS

Domestic food prices can differ substantially from world prices because of transport and transaction costs and because of the insulating effect of trade and domestic grain marketing policies. Relatively little information is available on price variability in domestic markets of major food staples at the individual country level. An exception is Hazell, Shields, and Shields (2005), who analyze producer prices for wheat and maize in developing countries that consistently import at least one of these major staples.[16] These countries are expected to experience instability in domestic food prices resulting from world price shocks, especially if agricultural markets have been liberalized and trade restrictions are minimal. Hazell, Shields, and Shields (2005) also analyze variability in producer prices for maize in 12 African countries that have weak infrastructure and more intermittent patterns of trade.

Like world prices, producer prices in most countries studied by Hazell, Shields, and Shields (2005) have generally trended down over time, and the study found no evidence of increased variability. In fact, in a few instances, such as wheat in India, variability in producer prices has declined significantly.

Cereal price variability does appear to vary considerably across countries, however. In the case of wheat, five of seven importers have CVs that are substantially lower than the CV of world prices (29 percent). In India, where prices have been the most stable, wheat marketing policies insulate domestic prices from world prices (figure 3.1). The two exceptions occur in Bolivia and Mexico, where CVs surpass 75 percent. Much of this instability probably results from macroeconomic shocks, especially sharp devaluations of exchange rates and high domestic inflation, rather than from the fundamental characteristics of Latin American grain markets or grain marketing policies.

In the case of maize, the majority of importing countries have a CV that is at or below the CV of world prices for yellow maize (23 percent), with the major exceptions again occurring in the Latin American countries of Bolivia, Brazil, and Mexico, where CVs surpass 65 percent (figure 3.2).

Among African maize producers that are more intermittent traders, about half have CVs above 20 percent, whereas the other half fall below 20 percent (figure 3.2). Maize producer price variability in most African countries remains comparable to variability in world maize prices.[17] The trend in price variability is significant in only a few countries, notably Tanzania and Namibia, and always negative (see Hazell, Shields, and Shields 2005). Overall this sample of African countries offers little evidence that domestic price variability is high relative to world prices or that instability is increasing over time.

Some of these African countries nevertheless have higher domestic producer price variability than others, and data for particular countries, regions, and commodities reveal serious price instability in Africa. From 1996 to 2003, when world maize prices were relatively stable, the wholesale price of maize in Addis Ababa varied from just about US$50 per ton to nearly US$250 per ton (figure 3.3). Maize is effectively a nontradable commodity in Ethiopia, and figure 3.3 shows how domestic maize prices have cycled between export and import parity over this period. The high cost of transporting grain in and out of Ethiopia creates a wedge of about US$150 per ton between import and export parity.

There is also little information on grain price instability faced by consumers in low-income countries. Data from Malawi, Mozambique, and Zambia indicate that consumers in southern Africa have ex-

perienced highly variable retail prices of white maize in the past decade (figure 3.4). This variation tends to be higher in inland and more remote areas, again partly because of the large wedge between import and export parity prices. At inland locations in southern Africa, coefficients of variation of 50 percent or above are common for consumer prices of maize (table 3.2). Mozambique, with the most liberalized markets, has the lowest price variability in the capital city of Maputo, but variability was much higher in remote areas of the country.

Overall, these results for Africa indicate considerable cross-country variation in the magnitude of domestic producer and consumer price instability, with more variable prices generally occurring in countries that trade intermittently and have a large wedge between import and export parity (that is, in countries where transportation and marketing costs are high; see the country typology in chapter 2).

SOURCES OF DOMESTIC PRICE INSTABILITY

To what extent is variability in domestic prices caused by world price shocks versus shocks to domestic production? For many reasons, changes in world prices are transmitted imperfectly to domestic markets. Some of these reasons are related to transaction costs in markets and others to policy interventions (box 3.1). Hazell, Shields, and Shields (2005) use a variance decomposition approach to examine how domestic prices of wheat- and maize-importing countries are influenced by world prices and exchange rates. They find that these variables explain a very small share of domestic price variability in their sample of countries, which suggests that most variation in domestic prices arises from domestic factors, such as production shocks.

For the 12 African countries where infrastructure is generally poorly developed, Hazell, Shields, and Shields (2005) use a similar decomposition approach to estimate the contribution of both world prices and domestic production variability to domestic producer price variability. Surprisingly, variability in world prices accounted for at least 25 percent of domestic maize price fluctuations in only three countries—Malawi (post 1991 only), Mozambique, and Zambia (table 3.3). Instability in domestic maize production accounted for more than 25 percent of producer price variability in five countries—Botswana,

Figure 3.1 Coefficient of Variation of Wheat Producer Prices, 1971–2002
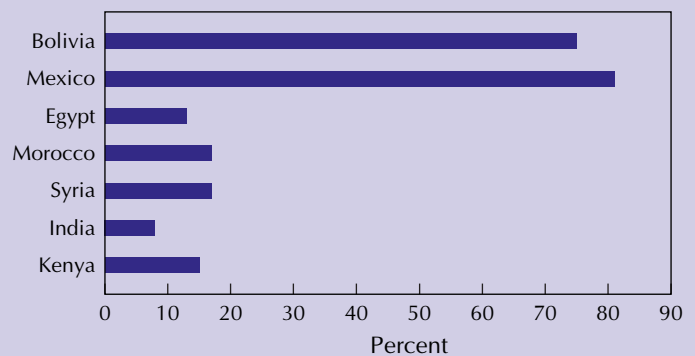
Source: Hazell, Shields, and Shields 2005.

Figure 3.2 Coefficient of Variation of Maize Producer Prices, 1971–2002
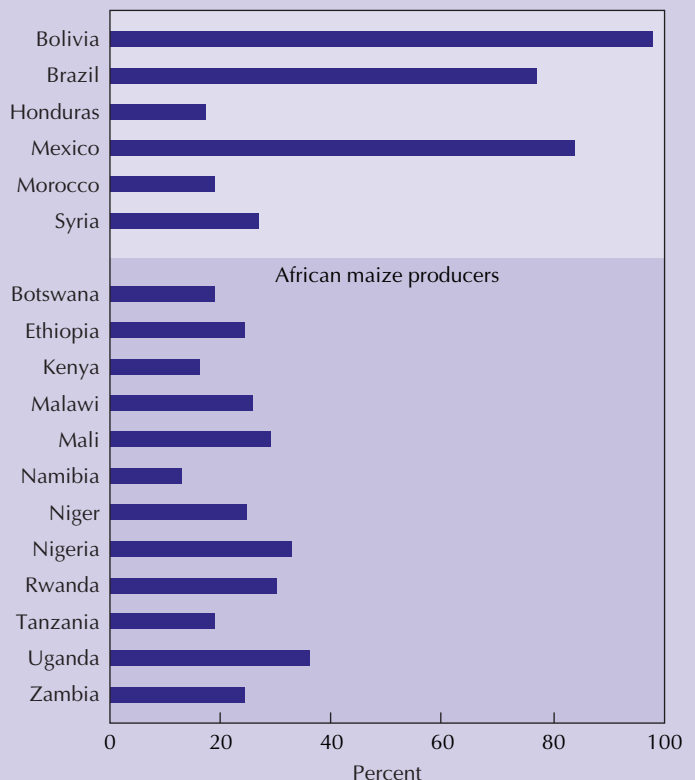
Source: Hazell, Shields, and Shields 2005.

Figure 3.3   Wholesale Maize Prices (US$/ton) in Addis Ababa Relative to Import and Export Parity Prices, Based on U.S. White Maize Traded via Djibouti, 1998–2003
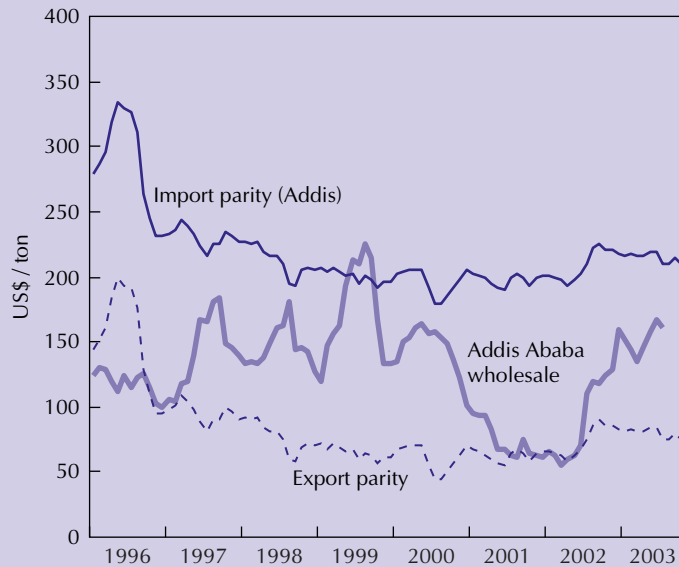
Source: del Ninno, Dorosh, and Subbarao (2005).

Figure 3.4   Wholesale Maize Prices (US$/kg) in Southern Africa, 1994–2003
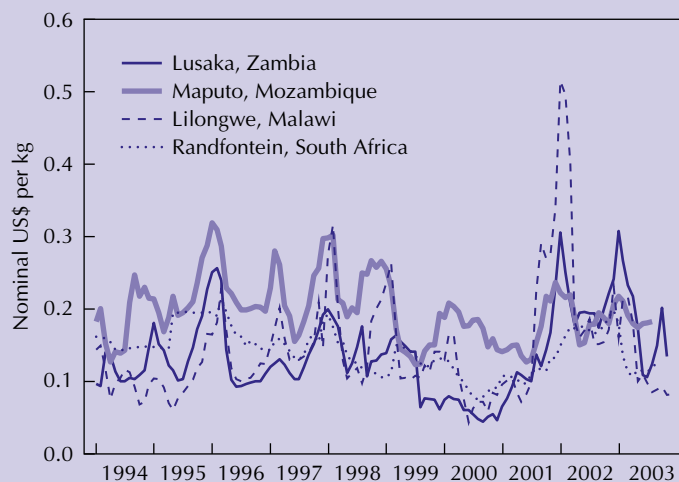
Source: Mozambique and Zambia: wholesale maize prices from Ministry of Agriculture; Malawi: retail maize prices from Ministry of Agriculture; South Africa: wholesale white maize price data from SAFEX, Randfontein.

Ethiopia, Mali, Niger, and Nigeria. The approach used to undertake the decomposition is crude and ignores lag effects. Nevertheless, the results provide support to the argument that domestic production instability is an important source of price variability in countries that are relatively self-sufficient and where there is a significant wedge between import and export prices.

WILL PRICES BECOME MORE UNSTABLE?

Some observers believe that the long, steady decline in world prices is ending and that a period of more unstable prices is looming. The two factors cited most often to support this view are the decline in global grain stocks and the prospects that global climate change will increase the uncertainty in agricultural production.

Because global grain stocks can buffer fluctuations in supply and demand, they can help stabilize prices. Mitchell and Le Vallee (2005) note important changes in the stockholding policies of the three largest grain-producing countries and regions: China, the European Union, and the United States. Together these producers account for 69 percent of world grain stocks. Over the past five years, global grain stocks have declined by almost 50 percent, with stocks in China declining the most (figure 3.5). China—now a consistent net importer of rice—is forecast to become the world's largest importer of wheat (Mitchell and Le Vallee 2005). The European Union began to reform its grain policy starting in 1992 and reduced its stocks. The United States changed its policy even earlier, in 1985, and also subsequently reduced its grain stocks. The combined impact of policy changes in these countries has been to reduce their grain stocks from 31 percent of total use in 1999 to 18 percent in 2003—the lowest level since the mid-1970s.

As stocks decline, prices may become more vulnerable to sharp upward swings if there are climatic shocks or rapid shifts in global demand. Furthermore, if China and other Asian countries maintain their current rate of economic growth, food exports and imports from Asia are expected to become considerably larger and more volatile, leading to higher and more unstable world food prices. If this speculation is correct, food-deficit countries may have to deal with both increased food price variability and possibly higher prices in the future.

On the domestic side, there is concern that production variability may increase, particularly because of global climate change. Global climate patterns have long-run cycles that are inherently noisy, and it is difficult to draw definitive relationships between climate patterns and crop yields. There is growing evidence, however, that extreme climatic events are becoming more numerous and are leading to wider fluctuations in crop yields in some particularly vulnerable areas of the world (for example, see Hulme 1996). If this is indeed the case, food production variability will increase in low-income countries that experience more frequent extreme climatic events, such as the counties of southern Africa (box 3.2).

MAIN MESSAGES ON THE NATURE AND EXTENT OF FOOD PRICE VARIABILITY

Despite the perception that the liberalization of grain markets has made food prices less stable, there is no evidence that price variability has been increasing over time, either in global or domestic markets. But it is unrealistic to assume that policymakers will escape the recurrent challenge of dealing with food price instability. Instability appears to have diminished little in many countries where food prices are quite variable, and in fact it may increase if grain stockpiling policies change in major producing re-

Table 3.2 Index of Variability in Monthly White Maize Prices in Southern Africa, January 1994 to August 2003

Country/Location	Coefficient of Variation	Country/Location	Coefficient of Variation
Mozambique:		**South Africa:**	
Beira	45	Randfontein	34
Maputo	26		
Nampula	58		
Malawi:		**Zambia:**	
Karonga	159	Chipata	55
Lilongwe	71	Choma	58
Nkhata Bay	62	Lusaka	59
Rumphi	44	Ndola	42

Note: SAFEX prices are for April 1996 to August 2003; Randfontein for March 1996 to January 2003.

Source: Mozambique and Zambia: wholesale maize price data from Ministry of Agriculture; Malawi: retail maize price data from Ministry of Agriculture; South Africa: white maize wholesale from SAFEX, and white maize selling price from Randfontein Maize Board.

gions and if global climate change further destabilizes food production.

Most domestic markets, even in middle-income countries that consistently import grain, appear to be integrated only weakly into global markets. Various transaction costs along supply chains im-

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Box 3.1 The Imperfect Transmission of World Prices to Domestic Markets

Many studies have found that movements in world prices are transmitted very imperfectly into local markets. The transformation from world price to producer price begins with the average annual import price paid by a country, the import unit value (IUV). The IUV need not closely follow the average annual world price of a commodity because of differences in quality and the country's seasonal distribution of imports, the use of forward price contracts, and the particular mix of world market locations used. Food aid shipments of some staples at concessionary rates may also affect the average IUVs paid for those staples. In some low-income countries with limited foreign exchange earnings, food im-

ports themselves can have an important effect on IUVs expressed in local currency. For example, a sudden increase in food imports could lead to a worsening balance of trade, causing the currency to devalue and making imports more expensive in local currency. The mapping of IUV in local currency to the average producer price can be affected by government intervention in the form of import taxes and attempts at price stabilization. Marketing institutions also matter, especially the size and temporal behavior of marketing and processing margins retained by all the relevant market intermediaries, and private sector decisions about storage, international trade, and regional shipments.

Source: Hazell, Shields, and Shields (2005).

Table 3.3 Disaggregation of Variance Components in Producer Prices for Maize, Selected African Countries (%)

Country	Period of Analysis	Variance of Border Prices	Variance of Domestic Production	Covariance and Unexplained	Total
Botswana	1974–1995	1	49	50	100
Ethiopia	1971–2002	1	22	77	100
		(2)	(34)	(64)	
Malawi	1980–2002	8	1	9	100
		(43)	(4)	(53)	
Mali	1988–2002	2	28	70	100
		(1)	(32)	(67)	
Mozambique	1985–2002	25	2	73	100
		(2)	(1)	(97)	
Namibia	1980–2002	3	11	86	100
		(1)	(1)	(98)	
Niger	1971–1995	5	57	38	100
Nigeria	1971–2002	12	26	62	100
		(7)	(16)	(77)	
Rwanda	1971–2002	5	1	6	100
		(10)	(4)	(86)	
Tanzania	1971–1995	19	15	66	100
Uganda	1980–1995	1	10	89	100
Zambia	1985–1995	37	5	58	100

Note: Figures in parentheses are for post-reform periods beginning 1991.

Source: Hazell, Shields, and Shields 2005.

Figure 3.5 Trends in World Grain Stocks, 1989–2004
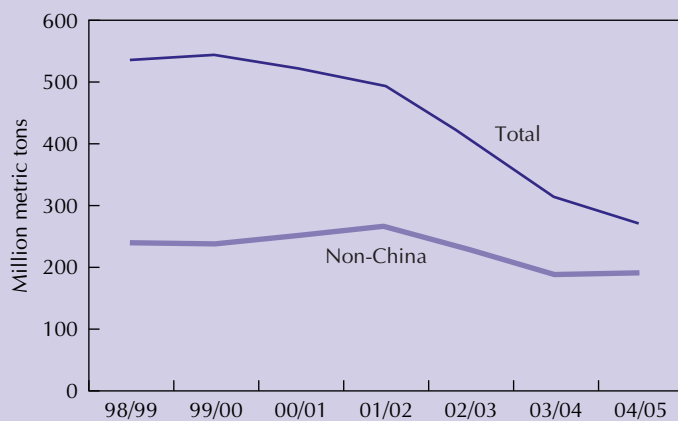
Source: Mitchell and Le Vallee (2005).

Box 3.2 Global Climate Change and Unstable Food Production

Global climate change may affect variability in food production by changing the incidence of pest losses, altering the length of the growing cycle, and increasing the frequency and severity of weather events such as droughts and cyclones. Studies by FAO suggest that rain-fed agriculture in the developing world is especially subject to greater stresses from climate change (FAO 2005). Persistent and more frequent severe weather changes (such as drought) are likely to make food supplies more unstable in some regions, leading to greater price instability on a local and global scale. Climate models suggest that recently observed variability in rainfall in southern Africa is related closely to long-term warming of the Indian Ocean, and the incidence of drought in southern Africa is projected to increase.

Source: Revkin (2005).

pede the direct transmission of world price changes into local markets, and most developing country governments still intervene in food markets to protect producers and consumers from world price swings.

Finally, production variability for food grains such as maize is higher in African countries, where high transportation costs often drive a large wedge between export and import parity prices. These circumstances explain at least part of the higher variability in domestic food prices observed in Africa, but untimely and unpredictable policy interventions have also contributed to this variability, as will be seen in chapter 5.

4 The Costs of Food Price Instability and Risk

There is general agreement that highly volatile food prices can impose significant costs on a society, particularly in low-income countries that import food and where many poor households spend a large proportion of their income buying food staples. But the naïve notion that volatility in food prices is somehow "bad" and stability "good" masks the complex and often poorly understood issues surrounding the costs of food price instability.

The potential costs of food price instability and risk can be broken down into three major categories: (1) economic inefficiency costs; (2) negative effects on income distribution and household food security; and (3) macroeconomic externalities.

ECONOMIC INEFFICIENCY COSTS

In market-based economies, price changes are important because they help redirect resources to more efficient uses and encourage efficient changes in consumption bundles following economic shocks. Yet there is a concern that "too much" price instability is costly. Food price instability certainly can impose costs on food market participants, but considerable costs can also be incurred by *not* adjusting to the underlying shocks that cause prices to change. So how much price instability is "too much," and what are the resulting costs?

To answer this question, it is important to understand why "excessive" food price instability in low-income countries causes the misallocation of resources and results in economic inefficiency. Several explanations have been put forward (see, for example, Dawe 2001; Timmer 2002). Briefly, food price risk is thought to lead producers, consumers, and traders to engage in such risk-reducing strategies as diversification into lower value but more stable products, minimal use of purchased inputs, and lack of trade in remote locations. Price risk may also reduce investment and make farmers and traders reluctant to use new technologies. While these are rational responses to risk, resources might be used more effectively if risks could be pooled or distributed more efficiently. Each of these responses works to distort resource allocation, investment, and consumption patterns away from their most efficient levels, with a resulting decline in the productive potential of the economy.

The economic foundation for the link between price instability and economic inefficiency lies with the theory of incomplete markets (Newberry and Stiglitz 1981). Without a complete set of credit,

insurance, and forward markets, risks cannot be pooled and shared efficiently, which distorts production and consumption decisions. There is little doubt that most poor households in low-income countries have only very limited and informal opportunities to obtain credit, insure risks, and sell commodities forward (Morduch 1995; Townsend 1995). It has been argued that in such circumstances the efficiency costs of food price instability are high, and price determination should not be left completely to market forces (see, for example, Poulton and others 2005).

The key empirical issue surrounding food price instability is the size of the efficiency losses in particular countries and situations. Newberry and Stiglitz (1981), Scandizzo, Hazell, and Anderson (1984), and others provided early estimates of the efficiency costs of price instability for a range of countries and commodities, and their work has been followed by many other quantitative estimates and simulation studies investigating the magnitude of efficiency costs.[18] Most of these studies have concluded that the efficiency costs from agricultural commodity price instability are generally quite small when measured as a proportion of incomes (around 0–2 percent).

There are four main reasons for these generally small estimates of economic efficiency costs. First, prices and yields are typically negatively correlated, so price instability does not necessarily lead to large fluctuations in producer incomes. Second, relative welfare effects on consumers are small unless consumers spend a large proportion of their income on the commodity in question and are highly averse to risk. Third, the welfare effects on producers and consumers generally move in opposite directions: If sharp price changes have a negative effect on producer welfare, they will often have a positive effect on consumer welfare. Fourth, most smallholder farming households are producers as well as consumers of food, and (as shown in chapter 2) more often than not they are net buyers of food staples rather than net sellers. Price instability will have little effect on the welfare of households that are not participating in the market in a major way.

An important point for this discussion, however, is that the vast majority of quantitative estimates of economic efficiency losses from commodity price instability have focused on *export crops* that typically comprise a very small proportion of domestic consumer expenditure, such as cocoa, coffee, cotton, jute, rubber, and wool. But what about *food crops*,

and what about countries that typically are either nearly self-sufficient in a staple or consistently import it? In these cases, domestic food grain prices may vary more than world prices (because of switching between import and export parity), and food expenditures may take up a much higher proportion of total consumer expenditures. Gabre-Madhin, Barrett, and Dorosh (2003) argue that food price instability can be much more costly for countries facing such circumstances. It is possible that economic efficiency losses from food price instability are higher than the 0–2 percent range typically found for export crops, provided countries have food consumption concentrated in a few staple crops, are landlocked or otherwise experience high transportation and transaction costs, and spend a large part of their foreign exchange reserves and consumer incomes on food (see the country typology in chapter 2). Despite the logic of these arguments, surprisingly little empirical evidence is available to evaluate the size of these effects in particular countries and situations.

EFFECTS ON INCOME DISTRIBUTION AND HOUSEHOLD FOOD SECURITY

The poor are the most vulnerable to food price instability and risk. Compared to households with more assets, poor households have fewer options for diversifying their productive activities and must spend a larger proportion of their income on food. The human cost of adverse price shocks can be devastating as poverty, malnutrition, and even famine deepen and become more prevalent.

Most research on the distributional effects of commodity price instability and price stabilization schemes has focused on the effects on producers versus consumers, finding that the relative burden borne by producers versus consumers depends on such factors as the strength of consumer and producer risk aversion, the shape and elasticity of supply and demand curves, the nature and source of the instability, and the proportion of producer incomes and consumer expenditures devoted to food commodities (Just and others 1978). Unfortunately the distributional effects of food price instability on consuming versus producing households cannot be generalized and need to be evaluated on a case-by-case basis.

However, a couple of key points should be kept in mind. First, many farming households in low-

income countries both produce and consume food, and if they are neither major sellers nor major buyers, then food price instability will be of little consequence to them. Second, larger-scale farmers who have a significant marketable surplus will be affected as producers, while smaller-scale farmers who are net purchasers of food (the most common case—see chapter 2) will be affected more like consumers (Finkelshtain and Chalfant 1997).

Second, the distributional effects discussed so far assume implicitly that all households are food secure—in other words, their incomes are sufficient to ensure adequate food intake for survival and reasonable health, even at relatively high food prices. Consumption choices then come down to trading off preferences for food against preferences for other types of consumption goods. But for food-insecure households, whose survival and nutritional status are threatened under adverse price or production outcomes, the costs of food price instability may be much higher than indicated by traditional welfare analyses of economic efficiency and distribution. These higher costs stem from two main sources:

1. A reduced probability of survival. Using a value-of-life approach, Myers (2005) calculates that if high food prices reduce the probability of survival by 1 percent, the resulting welfare loss would be valued at approximately 5 percent of household income. In very poor households where high food prices may significantly reduce the probability of survival, the value-of-life losses dominate the traditional welfare costs estimated for food price instability.

2. A reduced capacity to work. Even if price shocks do not reduce survival probabilities, they may decrease nutritional status to the point where labor productivity is severely curtailed. Traditional welfare analyses of food price instability take no account of these potential labor productivity losses.

Given the paucity of detailed case studies estimating the size of these effects in particular market situations, it is very difficult to provide a complete evaluation of these "food insecurity" costs of food price instability. Even so, they would appear to be potentially large in many low-income countries. For example, Ersado, Alderman, and Alwang (2003) and others have shown that drought can permanently reduce human nutrition levels and hence labor productivity.

MACROECONOMIC EXTERNALITIES

It has been argued that food price instability can impose negative externalities on the general economy, particularly when a food staple is a wage good or represents a large proportion of a country's gross domestic product (GDP) (Bidarkota and Crucini 2000; Dawe 2001; Dawe and Timmer 2005). Food price shocks can ripple through the economy and cause major macroeconomic instability, from business cycle fluctuations to exchange rate movements, changes in the general price level, and political upheaval. Macroeconomic instability may in turn retard economic growth (Choudhury 1995; Ramey and Ramey 1995; Deaton and Miller 1996). Various mechanisms have been suggested to explain how food price instability reduces investment levels and economic growth rates in low-income countries (Dawe and Timmer 2005).[19]

How large are these negative growth effects? Timmer (2002) argues that rice price stabilization added one-half to one full percentage point to GDP growth in the Indonesian economy in the 1970s. This is a huge number. Myers (2005) shows that a sustained growth reduction of this magnitude corresponds to an estimated welfare effect of approximately 5–11 percent of economy-wide income per year. Clearly, growth effects of this magnitude will dominate the traditional welfare estimates of the costs of commodity price instability, but the existence and magnitude of these growth effects remain controversial. Other researchers have found no statistically significant link between commodity price fluctuations and the rate of economic growth (see MacBean 1966; Deaton 1992; and Kannapiran 2000).

A final caveat is that these macroeconomic "externalities" are not externalities in the strict welfare sense, and it is not clear that macroeconomic fluctuations should be interpreted as indicators of "market failure." To be sure, one role of successful governments is to provide a stable macroeconomic environment within which investment is encouraged and economic growth can occur. But it is not clear that food price stabilization schemes are the most appropriate way to achieve these goals, even when food products represent a major share of GDP. Macroeconomic stability might best be achieved using traditional macroeconomic policies such as monetary policy, fiscal policy, and trade and exchange rate management, rather than food price stabilization schemes.

MAIN MESSAGES ON THE COSTS OF FOOD PRICE INSTABILITY

The empirical evidence from traditional welfare analyses suggests that economic inefficiency costs from food price instability are likely to be quite small, even in low-income countries subject to incomplete and underdeveloped markets. This is especially true if the country is diversified in its production and consumption of food crops.

Nevertheless the traditional welfare costs of food price instability may be considerably higher in other situations: when countries are specialized in production or consumption of one or two major food staples; when production variability is high and links with global markets are poor; and when large numbers of consuming households spend a large proportion of their income on food.

Add the possible effects of food price instability on survival and nutrition in low-income households, and on macroeconomic growth rates, and the costs of food price instability may also climb significantly. Unfortunately there is considerable controversy and very little empirical evidence on just how big these additional welfare costs really are for different countries in different situations.

The general message, therefore, is that it is likely that the overall costs of food price instability will be quite high, at least for some low-income countries in certain situations, but the evidence on just how high remains surprisingly sparse. Of course, even when the costs are high, price stabilization schemes may not necessarily improve welfare. Price stabilization schemes have costs of their own, and they may not counteract all of the costs of price instability.

Are there other, more effective ways to overcome the negative effects of food price instability? For example, if the major cost involves malnutrition or death for poor households when food prices soar, targeted subsidy and income support programs for the poor may be more appropriate. If the major cost involves negative macroeconomic externalities, appropriate monetary and fiscal policies may be more effective than food price stabilization schemes. The remainder of this report discusses how to evaluate appropriate ways of dealing with food price instability and risk, and their consequences.

5 Food Market Reforms: Experiences and Lessons

Views on how public policy can best address problems of food price instability and risk in low-income countries have followed broader trends in development thinking about the role of the state in food markets. This chapter provides a brief overview of the evolution of policy interventions in food markets and the lessons that can be distilled from these experiences for designing and implementing future policies. Three case studies of market reform are presented later in this chapter.

STATE-LED FOOD MARKETING SYSTEMS: SOMETIMES EFFECTIVE, ALWAYS COSTLY

Throughout the 1950s, 1960s, and 1970s, most governments engaged directly in food marketing through parastatal marketing boards or corporations that usually purchased, stored, and sold crops; controlled prices; and restricted private trade within and across borders. The prevailing view at the time was that private food markets were very underdeveloped and could not be relied on to bring about desired outcomes. In particular, the potential for highly unstable prices was viewed as significant and costly. Price stability for staple foods was seen as necessary to foster the adoption of improved technology, promote macroeconomic stability, and support the incomes of the poorest households (Jones 1994; Meerman 1997; Cummings, Rashid, and Gulati 2005).

In a number of cases, these interventions stabilized food prices and significantly improved poor households' access to food for a decade or more, as seen in Asia with the green revolution and in a small number of African countries (Kenya and Malawi during the 1970s; Zimbabwe and Zambia during the 1980s). This position has been bolstered by recent analyses indicating that price stabilization in certain Asian countries did achieve significant welfare gains and growth effects for the economy (Dawe 2001; Timmer 2002; Dawe and Timmer 2005).

Despite this good news, it is now well known that state-led policies incurred high and increasingly unsustainable costs. State-led models required heavy subsidies to offset the high costs of supplying food to urban areas. Most price policy interventions kept food prices low to benefit urban consumers. In many cases, producer prices were supported while consumers were subsidized, adding to the fiscal costs of interventions (Byerlee and Sain 1986). Because parastatal operations were susceptible to rent seeking, politically powerful groups

were able to appropriate many of the benefits.[20] In all of the African and most of the Latin American cases, the treasury costs associated with these policies eventually led them to become fiscally unsustainable (Jayne and Jones 1997).

MARKET LIBERALIZATION: UNEVEN IMPLEMENTATION, UNEVEN RESULTS

The liberalization of food markets was a central element of the structural adjustment programs that began in the 1980s. As the costs of government intervention became clear—in terms of subsidies as well as distorted incentives—donors and many governments pushed for market liberalization. Policy-based lending in the 1980s called for the promotion of marketing systems driven by the private sector, with little or no direct government intervention in markets, and supported by standard public good investments in infrastructure. These programs also called for liberalizing trade rather than maintaining food stocks as a means of balancing supply and demand.

The implementation of food market reforms has varied widely across countries. Dependent on structural adjustment loans, African and Latin American countries began to implement many aspects of the reforms in the 1980s, but some argue that these reforms have been partial (see below). In Asia and in the Middle East and North Africa, the record has been more mixed. Some countries, such as Vietnam and Bangladesh, implemented wide-ranging reforms, while others, such as India and Morocco, maintained their parastatal food marketing systems largely intact, along with their increasing fiscal burdens (Cummings, Rashid, and Gulati 2005).

Liberalization produced some clear wins. Fiscal subsidies and marketing margins have fallen in many cases, although not as comprehensively or by as much as anticipated. Experiences from eastern and southern Africa indicate that the adverse effects of reducing or eliminating consumer food subsidies were sometimes counteracted by other aspects of policy reform that encouraged new entrants and greater competition in the food system. For example, in the early 1990s, private marketing of grain in urban areas was liberalized and subsidies on commercially produced maize meal were eliminated in Zambia, Kenya, and Zimbabwe. Large-scale millers, who had enjoyed a protected oligop-

oly, swiftly lost a major part of their market to informal operators of small hammer mills, whose numbers rapidly expanded. The increased availability of hammer-milled maize meal at 60–75 percent of the cost of meal from large commercial mills partially or fully offset the adverse effect of eliminating consumer subsidies. Household surveys indicate that low-income consumers in particular shifted quickly to hammer-milled meal and benefited from the reforms.[21]

In Asia, Bangladesh successfully liberalized much of its food marketing system. This liberalization, together with the opening of private trade to India and other neighbors, has been an important factor in maintaining stable prices at much lower costs, even in the wake of a major natural disaster in 1998 (see the case study on Bangladesh below).

GROWING CONTROVERSY OVER FOOD MARKET LIBERALIZATION

Controversy over the reform programs and their impacts has increased. Up to the mid-1990s, there was a notable convergence among economists and the development community regarding the merits of market reforms and the need to continue this course (van de Walle 2001). From about 1995, this consensus has weakened considerably. Dissatisfaction with the limited progress in redressing poverty and farm productivity problems, especially in Africa, has often been attributed to food market reforms and wider macroeconomic adjustments (for example, see Poulton and others 2005). The role of food aid has generally increased (Barrett and Maxwell 2005), and agricultural growth and poverty reduction remain elusive, especially in the food crop sector (Byerlee, Diao, and Jackson 2005). This dissatisfaction has sparked a critical re-examination of the assumptions underlying support for market liberalization policies.

Some argue that the reforms have not worked because the private sector has not responded. One school of thought maintains that many of the perceived economic benefits of liberalization have failed to materialize, or that they have not been as great as anticipated (Reardon and others 1999; Sachs 2001; Kherallah and others 2002). The private sector has been slow to emerge in many cases, and private agencies for trade, storage, and input financing have not expanded to the extent expected (Dorward and others 2004). It is also widely perceived that market

reforms exposed farmers and consumers, especially those in remote areas, to greater price volatility (Gabre-Madhin, 2001). Price instability and its social and political costs have arguably been the Achilles' heel of many food market reform programs.

These analyses have emphasized market failures, transaction costs, and coordination failures, leading to arguments to reconsider some form of direct government intervention in markets beyond the standard public goods–type investments (Reardon and others 1999; Dorward and others 2004). This view suggests that the traditional dichotomy between private and public goods is unlikely to provide an effective or useful guide to policymakers, nor is it likely to provide a sufficient basis for understanding the appropriate role of government in food marketing (Joffe and Jones 2004).

A second school of thought contends that reforms have not gone far enough. Another interpretation of the experience in many countries is that market reforms were implemented only partially, sometimes quickly reversed, and often accompanied by other legal changes that undermined the intent of the reforms.[22] Private trade was indeed legalized but seldom supported, and in many countries old parastatals (or their new incarnations) continue to operate as major actors in markets (Meerman 1997). In some cases, successor agencies were formed with new names, ostensibly signifying a more truncated government role confined to holding strategic reserves, but in practice their activities were wide ranging and discretionary. Discretionary market operations by government without transparent and consistently enforced decision rules have exacerbated the coordination problems, risks, and transaction costs faced by private traders in developing food markets (Brunetti, Kisunko, and Weder 1997), which in turn have increased price instability (Jayne, Tembo, and Nijhoff 2005). Incentives for private storage and investment in storage facilities are often depressed by anticipated government actions to reduce the magnitude of intra-seasonal price rises, creating a vicious cycle that makes continued government action more necessary. Public investment to improve the functioning of markets has also remained low, partly because public budgets for agriculture continue to be channeled disproportionately to subsidies (Jayne and others 2002; Cummings, Rashid, and Gulati 2005).

Because of these factors, empirical assessments of food market performance since the 1990s in many cases reflect not the impact of unfettered market forces but rather the impact of a mixed policy environment in which legalized private trade operates uneasily within a context of continued strong government intervention in food markets (Bird, Booth, and Pratt 2003; Avalos-Sartorio 2005; Jayne, Tembo, and Nijhoff 2005). This school of thought also highlights the role of government intervention in channeling resources to key political constituencies in the new multiparty political systems that emerged in the 1990s. Indeed, the uneven manner in which reforms have been implemented reflects the influence of these elements of the political economy.

Both sides of this controversy have merit, as seen in the case studies that follow. It is naïve to expect the private sector to step in immediately after the withdrawal of public marketing agencies, especially where transaction costs and risks are high. Yet continuing and unpredictable public intervention in food markets has aggravated the risks and undermined the incentives for private investment in market development. The challenge lies in making an orderly transition to an improved marketing system. The case studies in the next section describe three experiences with implementing food market reform. They point to some of the benefits as well as the lessons from market liberalization.

THREE CASES OF FOOD MARKET LIBERALIZATION

The experiences summarized in the following brief case studies range from relatively negative in southern Africa to more positive in Mexico and Bangladesh, which made significant progress in stabilizing markets through private trade and other means (although Mexico continues to incur high fiscal costs). The lessons emerging from these cases and others are summarized at the end of the chapter.

Southern Africa: Should Governments Continue to Intervene in Maize Markets?

Malawi and Zambia have had a long history of heavy government involvement in maize markets (Byerlee and Eicher 1997). Both countries introduced reforms to allow more private-sector participation in food markets, but they still maintained parastatal food agencies. Their experience in managing the 2002 drought shows how government interventions worsened the impacts of that shock on food prices (Tschirley and others 2004; Rubey 2005).

In Malawi, the government was presented with a food balance sheet in May 2002 that forecast a deficit of 430,000 tons for the 2002–3 season. The government acted promptly by importing 250,000 tons of maize entirely through public channels (the National Food Reserve Agency) and arranged for 150,000 tons of food aid, for a total formal inflow of over 400,000 tons, nearly covering the forecast deficit. Unfortunately these decisions did not consider the large informal flows of white maize from Mozambique into southern Malawi—an estimated 150,000–250,000 tons—which left the country with a large maize surplus (Whiteside 2003).

In March 2003 the government, facing a good harvest and the prospect of storing maize for more than a year, decided to sell some of its accumulated stocks, depressing market prices to very low levels (less than two-thirds the levels in Zambia and southern Mozambique). This decision undermined incentives to farmers and private traders and ran up large fiscal costs. The government's actions reinforced the impression, developed through previous experience, that future shortages might not necessarily provide profit opportunities for private importers.

In Zambia, the government had frustrated private importers during past food shortages by sending confusing signals to markets. Similar confusion was evident during the 2001–2 food crisis, when the government announced its intention to import 200,000 tons of maize grain to cover a national deficit and to sell that grain at below-market prices directly to a small number of selected large-scale millers. Given this announcement, potential private importers stayed out of the market. When, facing a resource constraint, the government instead imported only 130,000 tons very late in the season, maize prices rose steeply (Nijhoff and others 2003). Because the grain was channeled to large-scale millers, consumers had to buy refined meal at a high price rather than purchasing the less expensive grain and milling it in a local hammer mill.

In Mozambique, by contrast, private trade plays a more prominent role on a regular basis and the government simply stays out of the import business. Southern Mozambique contains the nation's largest urban population and is perpetually food deficient. The center of the country is typically but not always in surplus, whereas the north produces a surplus every year. In response to this production pattern and to the long distances and high costs of transporting maize from the north to the south, Mozambique has maintained open borders to maize and other trade, regularly exporting from the north and importing from South Africa to the south. Largely for this reason, maize prices in Mozambique remained relatively stable during the 2001–2 crisis, well below levels in Zambia and Malawi (Tschirley and others 2004).

Liberalization of Rice Markets in Bangladesh: An Antidote to the Floods of 1998

Rice dominates food consumption in Bangladesh, providing 87 percent of starchy calorie intake. For many years, a public marketing agency purchased rice at fixed prices and distributed it through subsidized sales channels, but in the early 1990s a number of reforms were introduced. The general ration shops for subsidized rice were closed. The government initiated targeted rice distribution programs for the poor and other populations at risk, and the government liberalized the rice trade. The private sector began to import substantial amounts of rice from India following poor harvests in Bangladesh. This system was put to the test following the severe floods of 1998, which caused enormous crop losses, especially to the *aman* (monsoon season) rice crop. The government encouraged private rice imports through favorable policies such as removal of the rice tariff and expedited clearance of rice imports. Other factors contributed to a positive trade environment, including ample rice stocks in India, considerable foreign exchange reserves in Bangladesh, and the depreciation of the Indian rupee in the early to mid-1990s. Private-sector rice imports exceeded 200,000 tons per month for seven months in late 1988 and early 1999 (Dorosh 2001), compared to 34,000 tons in the entire 1996–97 year, and roughly 80,000 tons per month in the 1997–98 year. If the private sector had not been involved during the 1998 crisis, rice prices would have risen by an estimated 40–60 percent (del Ninno and Dorosh 2003). The poor suffered from reduced rice consumption and illness because of the floods, but the liberalized policies prevented rice prices from rising above import parity and forestalled a much worse deterioration in calorie consumption levels.

The public sector is not entirely disengaged from rice markets in Bangladesh. The government distributes rice to the poor and to other populations at risk during emergencies. The government continues to hold a strategic reserve and tries to set a floor price for producers. Public procurement and distribution have fallen to about 3 percent of national rice

utilization, however, which is considerably lower than in most other Asian countries (the comparable figure for India is 25 percent) (Rashid, Cummings, and Gulati 2005).

Mexico's Maize Market Reforms: Good Intentions but Mixed Results[23]

Maize is the dominant staple of Mexico, occupying about half of the cultivated land and grown by nearly three-fourths of the country's farmers. Traditionally, the government food marketing parastatal, CONASUPO, subsidized maize production, established import quotas, acted as a major importer, and set a national price for producers. CONASUPO also fixed and subsidized consumer prices.

CONASUPO was judged to be inefficient. Its operations were perceived to have exacerbated inequities in income distribution for several reasons:

- Most small-scale producers are net buyers of grain (see chapter 2), and the benefits of pan-territorial pricing were highly skewed toward bigger farms and owners of irrigated land
- The pricing system encouraged production in areas involving high marketing and transport costs and discouraged private traders
- Consumer subsidies were disproportionately focused on urban areas and did not reach most consumers in rural areas where many of the poor live
- The high costs of subsidies were eventually unsustainable

Avalos-Sartorio (2005) describes how a series of transitional liberalization policies prior to the implementation of the North American Free Trade Agreement in 1994 drastically reduced CONASUPO's interventions. A new state agricultural marketing agency, ASERCA, was established to facilitate private market development. Unlike CONASUPO, ASERCA does not directly buy and store agricultural commodities. Instead it supports target incomes to producers and subsidizes farmers' and traders' use of market-based instruments, including hedging with options. Under its PROCAMPO program, Mexico introduced to farmers direct income transfers, which are decoupled from producer prices. The new policies have been largely successful in encouraging private markets. Overall fiscal outlays remain high, although less distortionary, and the level and timing of marketing subsidies may hamper further development of private storage operations and discourage forward price markets. Finally, most of the benefits of indirect market interventions have gone to a minority of large commercial producers rather than to subsistence farmers. Although Mexico has implemented some important aspects of reform, elements of the reform that were designed to be politically acceptable to important stakeholders still hinder the development of a pro-poor and fully competitive maize marketing system.

LESSONS FROM REFORM EXPERIENCES IN ASIA, AFRICA, AND MEXICO

This brief overview and case studies highlight some of important lessons emerging from reform experiences over the past decade or more.

Price stabilization, as part of a much larger package to support agriculture, has contributed to economic development and stability, especially in Asia. Some argue that nearly all examples of sustained agricultural development in recent decades involved major direct state intervention in setting prices and distributing food staples (Dawe and Timmer 2005; Poulton and others 2005). Cummings, Rashid, and Gulati (2005) offer a more nuanced summation of the Asian experience, arguing that price stabilization did contribute to economic growth and macroeconomic stability, but that such interventions are unlikely to be cost-effective in most developing countries today. They emphasize the importance of government commitment on many fronts to achieve success in agricultural development, in general terms embodied in "improved institutions, incentives, and investments."

A commitment to stabilizing food prices through state marketing operations and stockholding is likely to impose high costs on the public treasury. The government subsidy bills in Asia "are staggering in all countries that continue to have significant parastatal presence" (Cummings, Rashid, and Gulati 2005). In Pakistan's Punjab, wheat subsidies exceed expenditures by the Department of Agriculture. In some countries of eastern and southern Africa, marketing board losses on maize trading and stockholding have sometimes amounted to 4 or 5 percent of GDP (Jayne, Tembo, and Nijhoff 2005). The high fiscal cost of Mexico's parastatal (CONASUPO) gave strong impetus to reform in the 1990s (Avalos-Sartorio 2005). The opportunity cost of these fiscal

outlays, in terms of the contribution to agricultural growth and poverty reduction that might have been achieved if these resources had been invested in core public goods, is likely to have been very high.

Food price stabilization policies are almost inevitably captured by special interests and become difficult to reverse. Stabilization programs that were modest in scope and designed to protect the more vulnerable segments of the farm community have generally evolved into very large, costly programs that mostly benefit a small percentage of the population, often larger-scale farmers and processors, who have thwarted efforts to introduce reforms (Avalos-Sartorio 2005; Cummings, Rashid, and Gulati 2005; Jayne, Tembo, and Nijhoff 2005). In most cases, donors and analysts have underestimated how political economy factors may influence the implementation of food market reforms. Where it is difficult to dismantle parastatals, a second-best solution is to implement measures to reduce fiscal costs, enhance efficiency, and (most important) ensure that they do the least harm to the long-term private development of the food system (Cummings, Rashid, and Gulati 2005).

Partial liberalization, with continuing government intervention in food markets, has often undermined the transition from a publicly controlled marketing system to a market-oriented one, by creating a high-risk environment for private operators and sometimes exacerbating price instability. There is a rationale for maintaining some role for the public sector in markets, especially during the transition to more liberalized markets, but discretionary and unpredictable government actions often pose greater threats to long-run market development than price instability in unregulated markets (Coulter 2005). Systems in which private trade coexists with continued direct government operations generally have not performed well when government operations are highly uncertain and discretionary (Jayne, Tembo, and Nijhoff 2005).

Conditions change, and food price policies must be continuously updated. Because production and consumption patterns and broader economic conditions change over time, the rationale for particular programs requires periodic reassessment. Most arguments for cereal price stabilization, for example, are founded on the notions that (1) one or two major food grains account for the lion's share of producer incomes and consumer food expenditures and (2) there is limited substitution between commodities. Yet the capacity of producers, consumers, treasuries, and foreign exchange reserves to handle price shocks has increased tremendously (see chapter 2). Despite these changes, "the policy environment in agriculture is still hung up with the priorities of the 1960s and 1970s" (Cummings, Rashid, and Gulati 2005).

6

Policy Options for Making the Transition to Private Markets

A central theme in this report is that the major priority of public policy for food systems should be long-run market development rather than short-run, "fire-fighting" responses to price instability. Almost all governments are concerned with three broad food policy objectives: increased food productivity to promote long-run income growth; the long-run development of markets to enhance efficient resource allocation and exchange; and protection of the interests of the poor and vulnerable from transitory crises. Effective policy options for making the transition to private markets must seek a balance among these three broad food policy objectives, and limited public budgets mean that trade-offs will be needed.

These issues are at the heart of this chapter, which begins by setting out eight broad principles to guide public policy interventions for managing food price risks and instability. These principles are meant to complement the far more detailed analysis that must take place in most countries, given that the appropriateness of a specific policy intervention and details of its design are heavily conditioned by country-specific factors such as those presented in chapter 2. The initial policy and institutional framework in a given country will also weigh heavily in policy design.

Over time, investments in market development can reduce the economic and political costs of price instability, especially if viable risk markets can be instituted. This process is necessarily a long-term one, but this chapter presents a few potential "quick wins" that can help in the medium term. Policies specifically designed to manage market risks are discussed in chapter 7.

GUIDING PRINCIPLES FOR PUBLIC POLICY DESIGN

The management of food price risks and instability should be viewed as part of a more holistic strategy to develop food marketing systems that foster broad-based economic growth, poverty reduction, and food security. A holistic approach is necessary to avoid instituting systems that narrowly target price stabilization but leave insufficient public resources for broader improvements in marketing efficiency and smallholder productivity. Research has consistently shown high payoffs to sustained public goods investments in areas such as research and development and physical infrastructure (Antle 1983; Oehmke and Crawford 1996; Alston and others 2000; Evenson 2001). Food security

strategies should refocus their emphasis from price stabilization per se to the sustainable promotion of productivity growth, market development, and poverty reduction. A central component of such a strategy is to reduce costs and risks throughout the food system, thereby making food prices more stable or improving producers' and consumers' ability to manage unstable food prices. Other components of this strategy include investments in irrigation, technologies that improve drought tolerance, extension services, and sustainable means of coordinating credit, input, and output markets so that smallholders will face fewer risks, manage them better, and absorb their impacts better.

The corollary to the first principle is that because public resources are always scarce, public expenditures should balance the need for long-run investments in sustainable market development and productivity growth with short-run policy instruments for managing food price risks and instability. Governments often feel pressure to prioritize public expenditures toward policies and programs that offer short-term payoffs but may do little to promote long-term growth. For example, many African countries are caught in a vicious cycle of frequent food crises that demand an emergency response that draws resources away from long-term investment in broader rural development. Notwithstanding the urgency of such crises, the ability to get on a long-run growth trajectory requires increased public investments, including investments in market development, research, and infrastructure.

Short-run interventions should promote rather than undermine long-run market development. An important role for food policy is to meet short-term food policy objectives in ways that ensure that these interventions do not undermine long-term market development. Many interventions that stabilize prices in the short run, such as export bans, sudden changes in import tariff rates, and subsidies to offset high import prices, can weaken market incentives and hinder the development of market-oriented risk management institutions.

Policy design should consider not only economic and equity dimensions but also the political economy of the reform process. The success of alternative policies may depend on the capacity and objectives of governments and the nature of their support base. Conceptually appealing options may not work in practice, owing to powerful vested interests that can influence policy implementation and outcomes. Advice on reforming food grain markets will be more effective if it reflects wide stakeholder dialogue, is attuned to political realities, and pays special attention to transitional and sequencing arrangements that mitigate the negative effects of policy changes on particular groups (van de Walle 2001; Bird, Booth, and Pratt 2003).

Policy should be consistent, predictable, and transparent, with open, rather than discretionary, "rules of the game." Market interventions, if appropriate, should be based on a well-defined set of a priori rules and not left to the discretion of parastatal agencies or government policymakers (Barro and Gordon 1983; Just 1985; Myers 1992a; Innes 2003). These rules, together with transparency in government actions, should be maintained over the long term to provide a predictable policy environment in which markets can grow.

The costs of market failures should be balanced carefully against the costs of government failures. Policy interventions have often been designed to compensate for the divergence between outcomes that are expected in conditions of perfect competition and outcomes that occur in the real world. However, such market failure is not sufficient justification for government intervention. The susceptibility of many government interventions to inefficiency and rent seeking often creates a wide gap between the potential and actual benefits of policies. These costs of government failure must be assessed against the costs of the market failure the intervention aims to correct.

Donors, especially food aid donors, should do no harm. Donor interventions have the potential to support long-run market development as well as to address short-term needs, such as safety nets. Past donor interventions, especially the provision of food aid, have sometimes weakened market development and sometimes, through the untimely release or local procurement of food aid, aggravated price instability. Donors have frequently provided policy advice that lacks coherence across different operations or lacks consistency over time (Bird, Booth, and Pratt 2003.) Finally, grain market policies in donor countries themselves, especially trade policies, shift domestic price instability to global markets, with negative impacts on food-importing countries (Anderson and Tyers 1993).

Policy should foster the use of market-based instruments for managing risks in ways that shift risks away from the most vulnerable food market participants. Policy should play an effective role in encouraging the emergence of intermediaries that

facilitate the use of market-based risk instruments that will benefit the whole market chain, without destroying incentives for the private sector to participate in risk markets.

CREATING SPACE FOR PRIVATE MARKETS TO OPERATE

In those countries—and there are many—where governments still dominate grain markets, the priority should be to identify those functions that can remain under government control and those for which an orderly transition to private markets can be mapped out. Although marketing systems may be liberalized in the sense that private traders are free to buy and sell, the behavior of government agencies and policies may leave little space for private traders to operate (Jayne and others 2002; Coulter 2005). How then can policies supporting direct government intervention be restructured to yield some of their benefits but control costs, minimize rent seeking, and provide an expanded role for private-sector participation? The exact sequence, of course, will depend on country-specific initial conditions, but a plausible sequence for a country in which a parastatal still dominates food marketing is outlined below.

Predictable Implementation of a Well-Defined Food Security Strategy

Food market reforms are often stalled or muddled by the lack of clear objectives for government intervention in food markets and a well-articulated food security strategy. Many (perhaps most) countries still define food security in terms of national food self-sufficiency that are ill adapted to the current era of liberalized markets and trade. Food security has dimensions of access to food as well as the means to acquire food, and it must be assessed at the household rather than the national level.[24] This wider definition of food security requires a multifaceted food security strategy, involving measures to reduce food prices by enhancing productivity or trade, improve food production in food-insecure farm households without ready access to markets, increase the incomes of the poor, and implement targeted measures to meet the immediate food and nutritional needs of the seriously undernourished.

Once this broader definition of food security is accepted, interventions in food markets to reduce

price instability must be evaluated against a number of subsidiary policy objectives:

1. Defining a "tolerable" level of price variability; it is much easier and cheaper to remove extreme prices than to stabilize prices completely
2. Defining the respective roles of domestic production, imports, and reserves in stabilizing food prices and supplies, and the role envisioned for the private sector and government in carrying out each of these functions
3. Minimizing distortions to long-run market equilibrium prices, defined in terms of border parity prices (Byerlee and Morris 1993; Timmer 1995)[25]
4. Utilizing scarce public resources in activities that offer high returns in the form of pro-poor growth and market development
5. Protecting the interests of the poorest and most vulnerable and ensuring they are the major beneficiaries of any remaining subsidies directed at household food security
6. Minimizing the risks of unexpected fiscal impacts of remaining interventions

Crafting a food security strategy within these sometimes conflicting objectives and constraints is a demanding task.

Transcending all of these points is the need to provide clear, well-publicized, and consistent rules to which the government will adhere in achieving these objectives. Attaining greater predictability of government policy—for example, knowing under which conditions a given parastatal will intervene in the market, and how—will provide more space for the private sector to undertake socially useful roles within a managed food system. In most countries, the movement from discretionary interventions to rule-based interventions is the first essential step toward providing an enabling environment for private market development.

Subsidy Reform to Level the Playing Field for the Private Sector

The next order of business should be to eliminate untargeted subsidies that alter market prices for all producers and consumers. Removing blanket subsidies is a prerequisite for leveling the playing field for the private sector. This action frees scarce resources for investment in long-run market development (for example, in infrastructure). Targeted

subsidies to protect the poorest and most vulnerable households will in most cases remain crucial, but care should be taken to design them in ways that minimize their effects on the level and volatility of market prices.

Subsidies result from the way that producer and consumer prices are set. Setting fixed pan-seasonal and pan-territorial prices at planting time exposes marketing agencies to the risk of substantial losses and distorts private incentives. To avoid these problems in the transition to liberalized markets, a number of intermediate steps are possible and often feasible.

Reduce the fiscal costs of producer price support. An alternative to fixed producer support prices is a *pooled pricing system,* in which a marketing agency announces at planting time an initial highly conservative price that will be paid to farmers, but the full price paid to farmers is not determined until after the crop is harvested and sold. In this way, farmers know the minimum price at planting, but the marketing agency has the flexibility to alter the final price after it has determined domestic and export sales revenue and marketing costs. The export parity price (in a grain-importing country) or the variable costs of inputs are examples of conservative options for determining the initial payment. If implemented in a disciplined, nondiscretionary manner by an efficiently managed marketing agency, pooled pricing has the virtue of minimizing the risk of losses for the public marketing agency (and hence the need for government subsidization) while providing a minimum support price for producers. A pooled price system was instituted with some success as a transitional step toward liberalized maize

markets in South Africa in the late 1980s and early 1990s. Providing second payments in a smallholder farm context may present some difficulties in ensuring that traders (who buy from farmers and sell to the crop-marketing authority) pass along the second payment to farmers, but this problem is not insurmountable when the second payment is announced publicly.

Target any remaining subsidies to the poorest consumers and producers. On the producer side, one strategy for targeting subsidies and removing market distortions is through decoupled direct payments to producers (box 6.1). On the consumer side, several of targeting mechanisms are available, including food-for-work programs, the use of "inferior" or "self-targeted" commodities for free distribution, and other types of countercyclical safety nets (discussed later).

Remove Remaining Restrictions on Grain Movements and Imports

Private markets cannot function effectively when the movement of grain is restricted within a country. Such restrictions not only undermine market development but, in decentralized political systems, greatly heighten tensions between regions (as in Pakistan; see box 8.1). Likewise levies and taxes on the movement of grain between districts, as in Zambia and Tanzania, constrain the development and integration of markets across regions, actions essential for reducing the effects of production variability on prices. One of the easiest "quick wins" to stimulate market development in many countries would be to lift such restrictions and taxes perma-

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Box 6.1 Direct Payments to Producers

By supporting the incomes of the poor directly, in ways that do not distort market incentives, it is possible to ease the pain of market reforms. "Decoupled" support programs provide direct cash assistance to farmers without raising food prices or encouraging recipients to remain in unproductive activities. They offer fixed and guaranteed payments to farmers, independent of the quantity produced, usually per hectare up to a maximum area. In countries where decoupled

support programs are feasible, tariffs can be reduced and other subsidies can be phased out relatively quickly. Experiences in Mexico and Turkey show that this approach can be practical for relatively advanced countries (World Bank 2005a), but most low-income countries cannot afford direct payments or lack the institutions (especially a land registration system) to implement them effectively. In these cases, reforms may need to be introduced more gradually.

Source: World Bank (2005a).

nently, enshrining the freedom to move grain across district or state borders into law (or even into the constitution!).

A logical next step is to liberalize trade on imports and exports, allowing the private sector to enter this market (see the final section of this chapter). Licenses to import or export should also be replaced by the registration of grain shipments to serve as an information base for all market participants.

Introducing Flexibility into Pricing Policies

Countries should move away from pan-territorial and pan-seasonal prices. Fixing prices over time and space provides disincentives to private traders to store grain or move grain from surplus to deficit areas. A simple means of alleviating this problem is to set procurement and release prices from public stocks based on seasonally adjusted storage costs (with the lowest price after harvest). This strategy provides incentives to the private sector to participate in storage activities. In Pakistan such a system of seasonally "cascading prices" met with an encouraging response from the private sector.[26] It is conceivable that prices can be fixed by region according to transport costs and surplus–deficit status, but that would be difficult to implement in practice. More information on grain markets is required, and it is politically awkward to pay lower prices to farmers in more remote regions with higher transport costs (Coulter 2005).

A further refinement is to move from fixed prices to setting floor and ceiling prices, which the government or marketing agency defends through purchases or sales onto the market. Market forces are then free to move prices within this band, but extreme price movements are eliminated by the floor and ceiling prices. Clearly, this option should increase the incentives for private-sector participation while reducing the costs of the program (Buccola and Sukume 1988; Pinckney and Valdes 1988). In practice, grain procurement and release to enforce price bands is difficult to manage, and success stories are scarce. Price bands in food-importing countries are somewhat easier to implement through variable tariffs (see discussion in chapter 7).

Tendering to the Private Sector

If relaxation of fixed prices is accepted, a public marketing agency can authorize procurement, sales, imports, and even storage based on a competitive tender system, perhaps using the system to protect a price band (floor and ceiling prices). This strategy essentially requires the marketing agency to participate in the market along with everybody else, although the scale of their participation may lead to the exercise of market power. As with direct government operations in the market, the tendering of grain purchases to the private sector requires good knowledge of supply and demand conditions, including accurate crop production estimates, estimates of marketed quantities being sold off the farm, and price information systems to provide timely feedback on the effects of market operations. This system, if properly implemented, may help develop capacity in the private sector. An example of tendering for procurement is the local grain purchases by Ethiopia's Food Security Program (box 6.2), although setting a support price is not an

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Box 6.2 Tendering of Grain Procurement for Public Distribution in Ethiopia

Under the Food Security Program in Ethiopia, local trading firms are invited to bid on purchasing set quantities of grain in designated surplus areas and delivering them to designated deficit regions, where they are distributed as food aid or sold in markets. The program, which is designed to complement rather than substitute for market activities, is scaled up or down depending on harvest estimates and food aid needs. Several evaluations indicate that under appropriate conditions and operating modalities, local purchase programs have the potential to stabilize prices and encourage investment by local private traders. These programs also have the potential to destabilize prices, however, if the tendering agency miscalculates supply and demand conditions and issues tenders for too much grain.

Source: Amha and others (1996).

objective. On the consumer side, Malawi is designing a system to tender maize sales in remote regions through the private sector.

POLICIES FOR DIRECT SUPPORT TO MARKET DEVELOPMENT IN THE MEDIUM TERM

Coulter (2005), Gabre-Madhin (2005), and others provide a broad overview of the many entry points for public policy for market development, centered on the "three Is"—incentives, institutions, and infrastructural investments.

- *Incentives* largely relate to policy reform, to level the playing field and create space for the private sector as discussed above.
- *Institutional arrangements* include contract enforcement, market networks and coordinated value chains, grades and standards, and market information services.
- *Infrastructure* includes public investment in roads, communications, and critical marketing infrastructure.

Consistent implementation of these "three Is" is the key to successful management of food price risks and instability over the long term. A full discussion of these policies is beyond the scope of this report, but this section will focus on three interventions that can often make a difference in the short to medium term: (1) improving forecasting and information systems, (2) liberalizing regional trade, and (3) building private-sector capacity.

Improving Crop Forecasting and Market Information Systems

In many countries, estimates of food production are unreliable. Public agencies and private traders often over- or underestimate import needs, or they make poor decisions on storage. For example, Zambia no longer can accurately estimate maize production from the large-scale farm sector, as responses to its annual production questionnaires are low. Likewise, food balance sheets and import requirements are often determined without reference to informal cross-border trade or local "food security crops" such as cassava, which inflates official import requirements and exacerbates food price uncertainty and volatility (see the case of Malawi in chapter 5).

A major priority in many countries is developing improved crop forecasting and supply estimates, which can help private and public marketing actors avoid exacerbating market instability through poorly informed trade and stock release decisions (box 6.3). Food supply estimates must be developed within the context of overall *food balance sheets* that include substitute "food security" crops. Early warning systems in drought prone areas have been developed in most African countries in recent years to guide emergency responses, and some, such as the systems in Mali and Ethiopia, seem to work reasonably well.

The other major priority is *market information systems* that are commercially oriented but at least partially publicly financed. Most public systems do little more than collect market prices and report them, too often late and inconsistently.[27] In some cases (for example, in Kenya and, very recently, Malawi), the tendency has been to bypass public systems in favor of private systems, which are seen as potentially more client oriented and sustainable. Yet the public good nature of basic market information means that fully private systems will not be profitable for the foreseeable future, and public-sector involvement is most likely needed. At the same time, these information services should have the financial and managerial autonomy to generate revenue, seek additional outside funding, and manage these funds. The objective is to supply increasingly relevant information to private traders while providing policymakers with information, analysis, and perspectives to make well-informed emergency response and market development decisions.[28]

Liberalizing Regional Trade

Liberalizing border trade can be an important part of overall policy liberalization in the food sector, with considerable potential to stabilize food prices and reduce food prices to consumers. Trade liberalization protects domestic food markets against domestic shocks by allowing more food to be imported in times of shortage and exported in times of plenty. Historically, many countries have chosen to take the opposite approach, which is to tax imports and discourage exports to keep domestic markets isolated from international shocks.

If production variability is not highly correlated among countries in a region, and if those countries are well integrated through regional trade, it may

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Box 6.3 Market Information for Emergency Responses

Market information systems must serve governments and donors during a crisis. During the onset of a crisis, timely price information is needed to assess the degree to which supplies in more accessible areas are reaching more remote areas through markets. During the crisis response, these data are also needed to determine whether food aid is reaching intended beneficiaries and not depressing markets. Finally, these systems need to track price trends for food staples and the assets, especially livestock, that tend to be liquidated during crises. Plummeting livestock-to-staple price ratios are a classic indicator of mounting vulnerability as increasing numbers of households sell livestock to purchase staple foods.

Better information must be complemented by better analysis. In times of crisis, a number of different types of information and analysis can improve policy responses:

- Information on household budget shares and cross-price elasticities of demand among staples, broken down by income level. Consumer budget share data must be combined with improved and more comprehensive food balance sheets to account for substitution effects and avoid biases that lead to overestimates of food import and food aid needs in crises.
- Incidence of different coping mechanisms used by households, classified by their likely order of appearance during a crisis compared to some baseline. Simple questionnaires can collect this information, along with the levels of a range of household assets that might be liquidated over the course of a crisis.
- Household income shares from different sources and an assessment of the likely impact of a crisis on the level of income from each source can be very useful in determining the balance between food aid, cash transfers, and market responses.
- Simple models to predict likely internal and regional informal trade flows.

Source: Tschirley and others (2004).

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be possible to cancel the effects of small country size on production variability. Production variability across an entire region is almost always considerably lower than it is for individual countries (Badiane and Resnick 2005). Even in Southern Africa, where maize production variability is highly correlated in South Africa, Zambia, and Zimbabwe, production patterns in Mozambique and Malawi are largely uncorrelated with the rest of the region, which bodes well for regional trade to help stabilize price levels (box 6.4). Badiane and Resnick (2005) conclude that regional trade in Africa is a win-win option in terms of both efficiency and price stability.

Despite its potential to stabilize food supplies and prices, regional trade occupies only a small share of the total grain trade in most regions, with some exceptions. Bangladesh is one country that has pursued regional trade liberalization with considerable success (Dorosh 2001) (see chapter 5); another is Mozambique, which enjoys the most stable prices in southern Africa (Tschirley and others 2004).

Efficient regional trade certainly depends on the long-run development of key infrastructure, especially better ports and road connections. In the short to medium term, however, policy and institutional changes can facilitate regional trade by reducing or eliminating tariffs and by reducing cross-border trade barriers, both regulatory (for example, phytosanitary standards) and bureaucratic (for example, border crossing documentation). Even unilateral liberalization by a country can greatly facilitate the use of trade to reduce supply and price instability. Regional trade will work most effectively, however, when countries in a region liberalize domestic markets and harmonize remaining food policy interventions (banning export restrictions, for example)—a much more daunting challenge.

Building Private-Sector Capacity

Poor coordination along the value chain often reduces the efficiency of food markets and leads to underinvestment in market development, because complementary investments are not made by the various players in the supply chain (Dorward and Kydd 2002). In such situations, joint public-private

Box 6.4 Variability and Covariance of Maize Production in Africa, 1995–2004

Production variability in small countries may be reduced through regional trade, depending on the covariance of production among countries within a region. For this sample of countries and commodities, grouped by region, the table on the left indicates that variability in food production (as measured by the coefficient of variation of maize production) is generally lower for the region than for individual countries. The covariance of production is still very high among several countries of southern Africa, but it is relatively low among others, highlighting the potential for regional trade to at least partially stabilize individual countries' food supplies and prices.

Source: Authors.

National and Regional Production Variability, Eastern and Southern Africa

Country/Region	CV of Maize Production, Years
Ethiopia	12.6
Kenya	8.9
Tanzania	11.2
Uganda	8.2
East Africa	**5.8**
Malawi	21.6
Mozambique	4.9
South Africa	20.3
Zambia	30.6
Zimbabwe	40.9
Southern Africa	**17.9**

Source: FAOSTAT.

Correlation Matrix for Maize Production in Southern Africa, 1995–2004

	Zimbabwe	Zambia	Malawi	South Africa	Mozambique
Zimbabwe	1.00	0.42	0.12	0.44	−0.31
Zambia		1.00	0.09	0.38	0.11
Malawi			1.00	0.17	0.24
South Africa				1.00	0.41
Mozambique					1.00

Source: Calculated from FAOSTAT.

action can reduce the transaction costs and risks of private investment in critical services. In smallholder agriculture, for example, public-private action may include support to build sustainable commercial relationships along the value chain, business development services, and specific mechanisms for reducing the risks facing private investors (such as co-financing critical investments).

Such investments aim at building particular institutional arrangements that can be maintained by the private sector without public support after the initial phase. They may include strengthening links between smallholders and markets by building networks; facilitating contractual arrangements; and providing matching grants for coordination along the marketing chain, such as the farmer-owned cereal banks in Kenya (box 6.5); and co-financing critical market infrastructure, such as storage at the

farm, community, or national level (as with maize storage in Uganda; see box 6.6).

These approaches require a supportive general business environment. They also require a relatively sophisticated capacity within government to (1) develop a strategic vision as the basis for coordination efforts and (2) design, monitor, and evaluate effective interventions.

A high priority in many systems is to build private storage capacity so the private sector can play a more effective stabilizing role in the food systems of developing countries. The experience with group or collective storage initiatives by small-scale farmers has been mixed (Coulter 2005). More success has been achieved by schemes that focus on increasing storage capacity at the individual farm, firm, or family level. These schemes, which provide technology, materials, and sometimes credit,

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Box 6.5 Farmer-Managed Cereal Banks in Western Kenya

The Rockefeller Foundation has supported the establishment of community-owned cereal banks managed by associations of maize producers in western Kenya. These banks essentially allow farmers to bulk their sales (first at the village level and then across villages), establish uniform quality standards, and negotiate sales with large purchasers, especially millers. The cereal banks have also established retail outlets in the villages. More than 20 such banks have been established, with more than 2,000 farmer-shareholders. Linked to a commercially owned market information system, the banks have obtained maize prices surpassing those paid by local traders by 50 percent or more. A local nongovernmental organization facilitated formation of the associations. While initial experiences have been very positive, it remains to be seen if similar institutional innovations can be scaled up rapidly and effectively.

Source: A. Adesina, personal communication.

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essentially subsidize investments in private storage capacity.

The government's role in building the private sector's capacity pertains just as much to what it should *not* do as to what it should do. Survey evidence from private traders and potential investors in Africa during the 1990s showed that fear of policy reversal was a major impediment to investment (Brunetti, Kisunko, and Weder 1997). Efforts to build private-sector capacity are unlikely to go very far until incentives and space are provided for the private sector to operate. By realigning government policies and programs so that they do not overly constrain private-sector incentives, many countries can achieve "quick wins" that will improve how markets function and reduce price instability.

Box 6.6 Public-Private Partnerships—The Uganda Grain Traders Model

Maize traditionally has been a nonstaple crop in Uganda, grown by smallholders under low levels of inputs and yielding little. The grain market was not well developed, and operational reserves for storage were lacking. Exports through ad-hoc border trade with Kenya and purchases by the World Food Programme (WFP) were highly variable (WFP purchases of maize ranged from a low of 8,500 tons in 1997 to a high of 98,500 tons in 2003). This variability, combined with variable demand from the Kenyan market, led to highly unstable prices. Three major price collapses have occurred since 1988, with prices fluctuating between US$50 and more than US$300 per ton.

Enter the Uganda Grain Traders. This consortium of 16 private grain traders was formed in 2001 in partnership with the government to exploit Uganda's emerging export market for grain (maize and grain legumes), coordinate export development, and improve the quality of exports. The public sector contributed by financing construction of the storage facilities. The consortium operates the facilities and buys and sells grain (which includes selling to export markets and the WFP). The better-organized market and expanded storage facilities have developed Uganda's grain exports and helped stabilize domestic prices.

Source: Magnay (2004); Poulton and others (2005).

7

Specific Policy Options for Managing Price Instability and Risk

Chapter 6 discussed broad policy options for making the transition to private markets and promoting market development, options that would go a long way toward reducing price instability and risk. This chapter describes four policy options that focus specifically on managing price instability and risk. The first two—(1) piloting and facilitating the adoption of market-based risk management instruments and (2) providing countercyclical safety nets for the poor—are consistent with creating space for private markets and transitioning to a market-based system. The second two—(3) variable tariffs and (4) strategic reserves—are more interventionist policies. They must be applied with great care, if at all, and be accompanied by specific safeguards to ensure "arm's-length," rule-based management.

Market-based risk management instruments and countercyclical safety nets might best be viewed as long-run investments that require institutional innovation and support and that eventually can be fully consistent with long-run market development. Variable tariffs and strategic reserves might best be viewed as short-run measures for achieving specific, immediate food security objectives, which ultimately may conflict with an extended transition to a market-based system.

MARKET-BASED RISK MANAGEMENT INSTRUMENTS

A market-based risk management instrument is any freely exchanged financial contract that allows parties on one or both sides of the exchange to reduce their exposure to risk or alleviate its consequences. A simple example is a bank loan, which can smooth variable income flows and allow consumption to remain relatively stable over time. A more complex example is the purchase of a weather derivative, which pays off when rainfall falls outside an objectively defined and measured normal range.

Many types of market-based instruments either are being used or could be used to manage food system risks in developing countries. Similarly, many participants in the food system potentially could benefit from using these instruments, ranging from individuals, households, and firms engaged in producing, storing, processing, and trading food commodities to public marketing agencies participating in and regulating food markets. Table 7.1 summarizes the major types of market-based risk management instruments and sug-

Table 7.1 Market-based Risk Management Instruments and Their Potential Users

Potential User	Risk Management Instrument				
	Credit Markets	Warehouse Receipts	Futures and Options	Weather-index Insurance	Commodity-linked Finance
Small-scale farmer	High potential	High potential	Low potential	Moderate potential	Low potential
Small-scale trader or processor	High potential	High potential	Low potential	Low potential	Low potential
Larger-scale farmer	High potential	High potential	Moderate potential	High potential	Low potential
Larger-scale trader or processor	High potential	High potential	High potential	Low potential	Moderate potential
Consuming households	High potential	Low potential	Low potential	Low potential	Low potential
Public food/strategic reserve agency	High potential	Moderate potential	Moderate potential	Moderate potential	Moderate potential

Source: Authors.

gests the degree to which different potential users might find them useful. The major instruments—credit markets, warehouse receipts, futures and options contracts, index-based weather insurance, and commodity-linked finance—are discussed in the sections that follow.

Financial Markets

Credit markets are coping mechanisms: They do not reduce risks per se, but help individuals or firms mitigate the consequences of negative shocks after they have occurred. Access to credit markets facilitates borrowing to maintain consumption levels when incomes fall; makes critical investments possible; and also reduces or delays distress sales of assets, which are often detrimental to long-run productivity and growth (Rozensweig and Wolpin 1993; Morduch 1995; Townsend 1995).

Reliable access to credit at reasonable terms has high potential to benefit all participants in the food sector (table 7.1). Financial markets provide the foundation for a market-based approach to risk management. Without available and effective financial markets, it is difficult to see how many of the more sophisticated instruments discussed later will succeed in managing food sector risks, except perhaps for the largest firms and public agencies that can access international credit markets. Policy approaches to facilitating development of rural financial markets are discussed in detail in World Bank (2005b) and are not addressed further here.

Warehouse Receipts

A warehouse receipt system allows participants to deposit a stated quantity of a specified quality of a commodity into a warehouse, where it can be pooled with other grain of similar quality. A receipt is issued to the owner as evidence of location and ownership. The receipt is a negotiable instrument that can be sold or used as collateral for a loan, backed by the claim to the commodity held in the warehouse.

Warehouse receipts facilitate risk management in three main ways (Lacroix and Varangis 1996; Coulter and Onumah 2002; Coulter 2005). First, they give participants better access to formal credit markets by providing reliable, verifiable collateral for loans to mitigate the consequences of shocks. Second, warehouse receipt systems facilitate private storage, giving farmers the flexibility to market their crop at different times of the year rather than strictly at harvest, when prices are usually the lowest. This diversification of sales across time helps to manage risk and, when widely adopted, can also help reduce seasonal price variability (Lai, Myers, and Hanson 2003). Third, a well-structured and reliable warehouse receipt system generally makes food marketing more efficient by acting as a clearinghouse that enforces ownership claims and can be an impartial third party that guarantees performance on contracts.

Warehouse receipts are already widely used in grain marketing systems around the world to provide secure collateral for credit and as an instru-

ment for delivering traded commodities. Public food agencies and food relief agencies may also participate in and use warehouse receipt systems.

South Africa has developed a substantial warehousing industry for agriculture, but similar services are in very short supply elsewhere in eastern and southern Africa. The only comparable systems in this region are the warehouse receipt systems for grain in Zambia (box 7.1) and coffee in Tanzania, and a few localized pilot schemes for grain in Uganda and Kenya. If models like those in Zambia could grow and be replicated, they would add significantly to private storage capacity for smallholder farmers and also improve the efficiency, transparency, and competitiveness of grain marketing systems.

These systems and other means of improving private storage capacity and access to credit are unlikely to provide immediate relief for problems caused by short-run price instability and food insecurity. Instead they should be viewed as long-run investments in institutional capacity building. Several conditions must be in place to ensure that they can succeed and that a range of stakeholders participate: (1) an effective system of grades and standards; (2) sufficient trust, integrity, and quality control to ensure that there is essentially no default risk in using them; and (3) regulatory procedures and oversight to ensure the integrity of the system.

Futures and Options Contracts

Commodity futures contracts are commitments to make or take delivery of a specific quantity of a specified quality of a commodity at a particular location and time in the future. In most well-functioning futures markets, only a small percentage of contracts are satisfied by actual product deliveries.

Instead, traders offset their commitment by taking out an opposite position in the same contract (in other words, buying contracts that were previously sold and selling contracts previously bought). Because prices fluctuate between the time the initial position is taken out and the time it is closed out, holders of the contracts make profits or losses. By taking out futures positions whose returns are negatively correlated with profits from production, trading, or processing operations, the cash position becomes hedged, and overall portfolio risk is reduced. Box 7.2 provides a simple example.

Options are different from futures in that they give the option buyer the right, but not the obligation, to buy (a call option) or sell (a put option) the underlying asset (usually a futures contract in the case of commodity options) at a strike price specified in the option contract. The option can be exercised at a specified maturity date (and sometimes before, at the discretion of the buyer). Trade in options can be used to put a floor under losses but still allow individuals and firms to participate in gains when prices move in their favor. In this way, options operate a lot like price insurance, because a premium (the price of the option) is paid up front in order to reduce risk by guaranteeing a minimum return.

One of the major difficulties in using futures and options to manage food system risks in low-income countries is that there are few relevant markets. Table 7.2 lists some of the world's major food commodity futures and options exchanges. Almost all of the high-volume markets are located in industrial countries. Their contract specifications are designed to meet the needs of industrial country producers, traders, and processors. A major exception is SAFEX in South Africa, which provides regional futures markets for wheat, white maize, and

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Box 7.1 The Zambian Warehouse Receipts Program

The Zambian warehouse receipt program, launched in 2000, is regulated by the Zambian Agricultural Commodities Agency Ltd., a nongovernmental agency owned by stakeholders. To date, the program involves four certified warehouse operators and four banks. In 2004–5, farmers deposited 65,500 tons of maize, most of which was collaterally financed, and total warehouse capacity registered for 2005–6 is 120,000 tons. Commercial farmers constituted most of the early adopters of the service, but smallholders accounted for 9 percent in 2004–5, and their participation appears to be growing.

Source: Coulter (2005).

Box 7.2 Example of Futures Hedging

Suppose a trader buys 100 tonnes of white maize at 500 rand [R] per tonne with the intention of holding it, transporting it, and finally reselling it to an urban-based processor. The trader does not yet have a sell price and so is exposed to the risk of price declines. The trader sells one futures contract (equivalent to 100 tonnes) for September delivery at a price of R618 per tonne. A month later the trader has the maize transported and ready to sell but the prices have fallen and the price received from the processor is only R480 per tonne. The trader has lost R20 × R100 = R2,000 on the physical trade.

But futures prices have also fallen, and so the futures price for September delivery a month later is now R600 per tonne. The trader buys the futures contract back at this price and makes R18 × R100 = R1,800 on the futures trade (minus brokerage commissions). Hence, losses on the physical trade were offset by gains on the futures trade and overall portfolio risk is reduced.

If the prices had risen over the month instead of fallen, then extra profits on the physical trade would have been offset by losses on the futures trade and, again, overall portfolio risk would be reduced.

Source: Authors.

yellow maize. SAFEX contracts have been growing steadily in liquidity since the market was established in 1995.

Some developing countries, such as India and China, are moving to establish local futures and options exchanges, although there are severe obstacles to developing national futures exchanges in low-income countries, such as weak marketing infrastructure and lack of liquidity. Investing in the development of local exchanges should therefore at best be viewed as a very long-run response to problems of food price instability.

In the short run, existing global markets may be useful for managing food price risks, depending on basis risk—the extent to which local grain prices are correlated with futures prices quoted on global futures exchanges. If these prices move together closely, then the potential for managing price risks will be high, but if they are only loosely correlated, basis risk will be high, and futures and options hedging will not be effective at reducing price risks.

The degree of basis risk will differ by commodity and location and needs to be evaluated empirically on a case-by-case basis. However, unlike coffee,

Table 7.2 Major Global Futures and Options Exchanges for Food Staples

Location	Market	Main Food Crop Contracts
USA, Chicago	Chicago Board of Trade	Yellow maize, wheat, rice
USA, Kansas City	Kansas City Board of Trade	Wheat
USA, Minneapolis	Minneapolis Grain Exchange	Yellow maize, wheat
Canada, Winnipeg	Winnipeg Commodity Exchange	Wheat
Europe	Euronext	White and yellow maize, wheat, potatoes
Argentina	Rosario Futures Exchange	Maize, wheat
Brazil	Bolsa de Mercadorias & Futuros	Maize
Japan, Tokyo	Tokyo Grain Exchange	Maize, rice
China, Dalian	Dalian Commodity Exchange	Maize, rice, beans
China, Zhengzhou	Zhengzhou Commodity Exchange	Wheat
India	National Commodity and Derivatives Exchange	Maize, rice
South Africa, Pretoria	South African Futures Exchange	White and yellow maize, wheat

Source: Authors.

cocoa, and to some extent sugar, which have globally integrated markets (in other words, low basis risk), food grain markets tend to be more localized and insulated from one another because of transport costs, quality differences, and trade restrictions (chapter 3).

Some case studies have examined the basis risk and hedging potential for particular food crops in particular countries. Faruqee, Coleman, and Scott (1997) evaluated wheat imports in Pakistan and found good hedging potential using U.S. wheat and futures and options contracts. This finding has been supported by an analysis of hedging aggregate wheat and maize imports in several developing countries using Chicago Board of Trade wheat and maize futures and options (Sarris, Conforti, and Prakash 2005). Dana, Gilbert, and Shim (2005) evaluate the potential for Malawi and Zambia to hedge maize imports using SAFEX in South Africa, concluding that hedging could be an effective risk management strategy. These studies suggest that basis risk is low enough that existing global futures and options markets may provide effective hedging potential for food imports into low-income countries, at least in some important cases.

Where hedging potential exists, a key question is who will do the hedging. Among the potential users (table 7.1), small-scale farmers and traders would generally find the costs of individual participation prohibitive. Trading on global futures and options markets requires considerable resources, including access to credit, use of foreign exchange, good market intelligence, reliable and speedy communications, and the analytical capacity to construct risk-minimizing portfolios. Furthermore, the volume specifications on most global futures and options contracts are too high to be of use to small-scale operations. Even in industrial countries where the exchanges are located, farmers make little direct use of futures and options markets.

Larger-scale traders and processors (and even large-scale farmers) have higher potential to use futures and options because they have better access to the required resources and their scale of operations can accommodate the quantities specified in the contracts. A fairly large and sophisticated operation is required to trade directly in these markets.

The most commonly suggested strategy for low-income countries to use global food futures and options markets is for a public agency that controls or regulates imports to do the hedging (as in Faruqee, Coleman, and Scott 1997; Dana, Gilbert, and Shim

2005; and Sarris, Conforti, and Prakash 2005). In this case, countries are essentially hedging their export revenues or import bills, presumably to enhance macroeconomic stability and fiscal outlays. But when a public agency does the hedging, it is not always clear how the benefits of hedging will be passed back to the producers, traders, processors, and consumers that make up the food system. If the public agency is directly involved in procurement (it buys and imports or exports the grain itself), then the gains or losses from hedging can be passed back along the supply chain by altering domestic prices bid or offered by the agency.

One means of providing the necessary coordination without direct procurement is for a public agency to act as an intermediary. An example is the Agricultural Product Options Program of ASERCA in Mexico (see Avalos-Sartorio 2005). Grain producers purchase a subsidized option premium from the program in return for a guaranteed minimum price at harvest. ASERCA then constructs pooled hedges for all of the participating producers using Chicago Board of Trade options contracts. ASERCA never takes control of the grain, which is marketed through private channels, but it passes the benefits, and part of the costs, of option hedging back to farmers. In this way ASERCA essentially acts as an intermediary to facilitate price risk management by producers. Although farmers have made little use of this program to date (primarily because other government programs have reduced or destroyed the incentive to participate—see Avalos-Sartorio 2005), it does show how creative public policy can facilitate a market-based approach to risk management even when transaction costs, information costs, and diseconomies of scale are significant obstacles to small-scale farmers' participation. A similar program operates in Brazil.

Intermediation can also occur without direct government involvement. For example, large-scale traders, processing firms, supermarket chains, cooperatives, or farmer organizations can offer fixed or floor price contracts to smaller-scale producers, traders, and processors (box 7.3). The intermediaries pool the risks and hedge them using global futures and options markets. This is exactly what happens in many industrial countries. In the United States, for example, individual farmers (particularly those operating on a smaller scale) make very little direct use of futures and options markets, but grain elevators (that is, traders) offer these farmers cash contracts that have forward fixed or floor

Box 7.3 The Potential of Forward Contracts

Forward commodity contracting can be an important market-based risk management instrument. Forward contracts are agreements to exchange a specified quality and amount of a commodity at a future date and location, but at a fixed price agreed upon today. Relative to futures, forward contracts can be written for any amount and so have more flexibility to be used by small-scale operators. Any delivery location and product grade can be specified in the contract so there is generally no basis risk.

There are many ways that forward contracting could be facilitated. Formal commodity exchanges facilitate both cash and forward commodity buying and selling, by providing implicit or explicit guarantees on contract performance, encouraging networks where trust relationships can be built up to a level that will support forward exchange, and by imposing costs on those who default (e.g., exclusion from further participation in the exchange). Warehouse receipts can also play an important role in facilitating forward contracting by acting as a guarantee that the specified product

is available for future delivery. Finally, the existence of futures markets greatly promotes forward contracting and substantially lower costs, by allowing buyers to offer small-scale, individualized forward contracts to producers. Buyers can then pool the resulting risks and manage them on futures markets.

Although forwards are potentially more flexible and useful than futures contracts for small-scale farmers and traders, futures contracts are low-cost, highly liquid, and easily transferable financial instruments that do not incur default risk. In many developing countries the inability to enforce forward contracts, especially for staple food crops, means that default risks are too high to support viable forward markets without some form of guarantee on performance. Hence futures can transfer relatively large risks much more easily and at much lower cost than forward contracts, although as noted above, they are in practice complementary, when traders offer forward contracts to producers, backed by operation in futures markets.

prices embodied in them. For example, the elevator can offer farmers a forward contract that prices the grain at planting but does not require delivery until harvest. Alternatively, the elevator can offer a contract at planting that requires the farmer to deliver at harvest and guarantees a minimum price but allows the farmer to receive a higher price if prices rise over the growing season. The elevator is able to offer these contracts because it pools the resulting risks across a large number of farmers and then hedges the aggregate risk on futures and options markets. This strategy allows elevators to be competitive and attract business, while enabling farmers (indirectly) and elevators (directly) to manage their price risk through futures and options trading.

The choice between direct government procurement and hedging versus a decentralized approach, in which trade is undertaken by the private sector and hedging is encouraged via intermediation (by firms, strong farmer organizations, or by public agencies), is an important choice. If procurement and hedging are undertaken directly by a government agency, the incentives for private individuals and firms to participate will be reduced significantly. Furthermore, this approach will really only

work in countries that are consistent importers (exporters) and where import (export) requirements are known well in advance. For example, if a country that expected to import maize actually produces enough maize to export, then hedging the expected import requirement before the harvest is known could lead to unexpected and possibly large losses. Of course, uncertainty about the right quantity to hedge is a problem that also plagues individual farmers and firms, but they probably have better knowledge of their production situation—and can respond more quickly to changes in that situation—than a centralized government agency hedging aggregate imports or exports.

Because the use of futures and options markets by the public and private sector are unlikely to coexist easily, governments must choose between centralized control of procurement and hedging activities or a decentralized approach that encourages more private-sector participation. The latter approach has significant advantages and is more consistent with the long-run emergence and development of market-based institutions. Extensive, decentralized use of futures and options contracts will not emerge rapidly or spontaneously, however.

Growth will require public investments in education and capacity building, as well as institutional innovations that facilitate indirect use of these instruments by smaller-scale farmers and traders.

One final point about futures and options hedging is that even when relevant markets are available, they allow risk reduction only over the short run and generally are not useful for hedging annual income fluctuations over long periods (Gardner 1989; Lence and Hayenga 2001). This limitation in the degree of risk reduction has the benefit of forcing market participants to continue to be responsive to longer-run changes in prices, which is desirable from an economic efficiency perspective.

Index-Based Weather Insurance

Index-based weather insurance is a class of financial derivatives written against deviations from threshold rainfall or temperature indices that are constructed from weather data measured at secure weather stations throughout a country. For example, a farmer may pay a premium for an insurance contract that pays US$25 for every 1 millimeter that the observed rainfall index falls below its critical level of 500 millimeters per year, up to a maximum of US$5,000 (in other words, there are no extra payments if rainfall drops below 300 millimeters per year). If observed rainfall is below the threshold level, leading to low yields, the farmer receives a payment that can at least partially compensate for reduced crop production.

Index-based weather derivatives are quite common in industrial countries, where contracts focus primarily on heating-degree and cooling-degree days in major cities, and are used by firms whose returns depend heavily on the weather, such as electricity companies. Weather insurance is less common in developing countries, but a private market for rainfall insurance is emerging in India, and several other schemes have been piloted or investigated (box 7.4).

Box 7.4 A Proposal for Weather Insurance in Malawi

A proposal for weather insurance in Malawi has two components (see Ibarra and others 2005): a microlevel insurance product that can be sold to individual farmers and a macrolevel product that the government can use to obtain emergency funds to meet food security commitments in times of drought.

The microlevel product would:
- Focus on the important maize-producing region surrounding Lilongwe
- Construct a rainfall index that is highly correlated with maize yield outcomes in the region, based on rainfall data collected from the Lilongwe airport
- Estimate the extent of financial loss per unit area that is associated with changes in the index (for example, a 1-millimeter reduction in the rainfall index below a "normal" trigger level might cause, on average, a maize yield reduction of 10 kilograms per hectare, valued at 15 kwacha (MK) per kilogram, which gives an overall payout of MK150 per millimeter of the index per hectare)
- Set the trigger level that determines the deductible on the insurance (the amount of risk the farmer has to bear before the insurance payouts begin)
- Require that farmers have access to credit so they can afford the premium, and that insurers are willing to offer the product at premium levels that remain attractive to farmers.

The macrolevel product would:
- Focus on countrywide maize production
- Construct a rainfall index that is correlated with the average maize yield in Malawi, based on rainfall data collected at weather stations throughout the country
- Estimate the financial burden facing the government food reserve agency in times of yield stress (for example, to finance food imports or costly social safety net policies)
- Structure an insurance product that pays out according to the agency's need for funds as the country-wide rainfall index declines
- Require that the exact nature of the agency's financial burden is specified, and that an insurer is willing to offer the product at premium levels that remain attractive to agency participation.

Source: Ibarra and others 2005.

It should be clear that weather insurance is not focused directly on managing price risks, at least for the microlevel product used by farmers. In fact, when producers are receiving payouts on their rainfall insurance, yields should generally be low and prices higher (although incomes will be low because of reduced yields). In this way the insurance acts more like an income safety net for producers and less like price insurance. However, in principle there is no reason to restrict rainfall insurance to producers. Consuming households might also benefit from purchasing rainfall insurance if it provides income when local food prices soar owing to low rainfall and low local yields. The only real requirements for this alternative to be feasible is that the premium must be attractive to consuming households given the risks they face, and they must be able to pay the premium in advance. Weather insurance could also be used to manage the food aid requirements of donor agencies, as proposed in Ethiopia (Morris 2005).

Governments and government agencies could also use index-based weather derivatives to insure their liabilities in times of climatic crisis (box 7.2), but this strategy would be subject to severe rent-seeking problems without a credible commitment to use the insurance payouts for their intended purpose (Myers 1992a; Innes 2003).

The advantage of index-based weather insurance is that it is based on objective measures of readily observable events that cannot be influenced by human behavior. Such schemes avoid the moral hazard and adverse selection problems that plague traditional agricultural insurance schemes, which are based on individual farm yields. They also have low transaction costs and can be scaled down to payout levels that might interest relatively poor individual households.

The weakness of the index-based approach is that the returns to individual farmers or traders (or the food prices paid by individual consumers) may not be strongly correlated with the weather index and hence with the insurance payout. For example, if a farmer fails to receive a payout when yields are low, then the insurance will not provide effective risk management. This issue is similar to the basis risk issue for futures and options trading, and it can destroy the incentive to insure. Another complication is that enormous demand for index-based insurance products will expose the insurer to catastrophic risk. If the insured event occurs widely, many payouts will have to be made at the same

time. The price of insurance could rise because insurers will require a risk premium that compensates them for taking on this catastrophic risk, and if this premium is high enough, it will destroy the incentives for insurers to participate (Duncan and Myers 2000). The risk premium could be kept lower by reinsuring part of the risk on global insurance markets, if opportunities are available.

In summary, while index-based weather insurance may not be attractive to all food sector participants in all situations, these contracts do have considerable potential for managing risks and providing a safety net in times of climatic stress. Farmers, both small- and large-scale, are the obvious potential users, but others, including traders and even consuming households, may potentially benefit. Public agencies may also have potential demand for these insurance products, but an objective measure of an agency's liability under unfavorable weather outcomes is required. There is also a danger that rent-seeking will eat into the insurance payouts when they occur if the agency is not credibly committed to using the funds for their intended purpose.

Similar to the case of futures and options, the growth and development of index-based weather insurance will require public investment in developing not only the insurance products but the institutions that are needed to support viable insurance markets. This is another example of long-term institution and capacity building that is consistent with long-run market development.

Commodity-Linked Finance

A problem with most rural credit products is that there may be little connection between the income flows of borrowers and the service flow requirements of the debt. In other words, farmers may be required to make large loan payments precisely when their current incomes are low. One potential means of overcoming this problem is with commodity-linked finance. While there are many different types of commodity-linked finance, commodity-linked bonds are a prominent example (Priovolos and Duncan 1991). These bonds link the principal, and possibly interest payments, to future realization of a specified set of commodity prices, so that when commodity prices are high, debt service obligations are also high, but the bond issuer has the income to service the debt (and vice versa). In this way, commodity-linked finance

helps hedge price risk and smooth consumption streams.

Although commodity-linked bonds (and other forms of commodity-linked finance) are interesting in principle, they have several limitations for managing food price risks in low-income countries. Often the institutions and market infrastructure for supporting these financial products are lacking. In industrial countries, commodity-linked finance is used only by large firms that can accommodate the accompanying high transaction costs. A major problem is that there may be strong incentives to issue the bonds, but often there are no strong incentives to buy them, other than for speculative purposes. Because buyers require a significant risk premium before they are willing to hold these bonds, the interest rates can be quite high. For the same reason, these bonds tend to be very illiquid. The only viable way for commodity-linked finance to offer real risk management alternatives for individual farmers and households appears to be through some kind of public or private intermediary that issues the bonds on a wide scale and then packages the resulting financial instruments into products that might be accessible and of use to individual farmers and households. Commodity-linked finance would appear to hold more promise for managing the macroeconomic risks associated with import-export fluctuations and the external debt positions of governments rather than the individual risk portfolios of small-scale producers and households (O'Hara 1984; Myers and Thompson 1989).

ASSESSING THE POTENTIAL OF MARKET-BASED RISK MANAGEMENT INSTRUMENTS

The Advantages of a Market-Based Approach

Relying on a market-based approach to managing food system risks has a number of distinct advantages (Anderson 2001; Larson, Anderson, and Varangis 2004). Participation is generally voluntary, so people participate only at a level that suits their particular situation. In contrast, participation in traditional price stabilization schemes is compulsory: Everybody is subject to the stabilized prices. Furthermore, the welfare gains to individuals and firms using market-based risk management strategies are sometimes substantial, particularly

when risks and the degree of risk aversion are high (Anderson 2001).

From a policy perspective, a market-based approach to risk management should not require the large, persistent budgetary outlays that historically have been a feature of price stabilization schemes. Even if public agencies are trading futures and options, the trading profits and losses should approximately cancel each other in the long run, if the futures and options markets operate efficiently. It is important to note, however, that there could be large trading losses in the short run, which would presumably be offset by gains in physical trading operations or be passed back to others if the agency is operating as an intermediary.

Perhaps the most important advantage of market-based risk management instruments is that in general they facilitate and enhance the private sector's role in the food system rather than displace it. The use of market-based risk management can improve price discovery, enhance market efficiency, and improve price transparency and information dissemination throughout the marketing channel. These secondary benefits occur most commonly with organized commodity exchanges. For futures and options to work effectively, there must be an open, highly transparent system of exchange that facilitates information dissemination. These markets also generate incentives to collect market intelligence and information (because futures and options exchanges provide a forum for making trading profits based on superior information) and, in so doing, help to disseminate this information to other market participants through the price system. Finally, an important social benefit of futures and options markets is that they facilitate the collection of time-series data on market prices that can be used for evaluating market performance over time.

Challenges to Implementing a Market-Based Approach

For several reasons, low-income countries rarely use market-based instruments to manage food sector risks. When local shortages occur, it may be difficult to enforce contracts for food staples. The small size of the farming and trading enterprises that serve the traditional food sector in these countries, and the poorly developed financial markets, limit the liquidity required for successful trading. Few low-income countries have the market intelligence

systems, grades and standards systems, communication systems, storage and marketing infrastructure, and experience and education to use these markets effectively. Basis risk is another major impediment to both futures and options trading and index-based weather insurance.

Somewhat ironically, continuing government intervention in food markets may be one of the most serious impediments to innovation and to the development of risk management markets for the food sectors in many countries. Interventionist policies reduce or destroy the incentive to participate in market-based risk management mechanisms, because there is no incentive to manage risk when prices are effectively stabilized through policy, and because such policies tend to disconnect local prices from world prices, which reduces the hedging potential of the global markets. Furthermore, if government interventions are discretionary and difficult to predict, they simply add another layer of risk that individuals and firms may find difficult to hedge using available market-based risk management instruments.

In a liberalized market environment, however, governments can play an important role in facilitating and expanding the use of market-based risk management instruments. This role includes investing in:

- Basic market infrastructure, such as systems for transport, communications, grades and standards, and market information (see section 6.3). Lacking these basic investments, more sophisticated risk management instruments are unlikely to succeed.
- Institutions that support the development of rural finance markets, expand the availability of credit, and encourage and facilitate private grain storage.
- Analytical capacity, technical support, and education to facilitate use of global futures and options markets by large-scale domestic producers, traders, and processors.
- The development and support of intermediary institutions that can pool and repackage the risks facing small-scale producers, traders, and processors and then hedge the pooled risks using global futures, options, and insurance markets.
- The development of objectively measured weather indices that can provide a foundation for index-based weather insurance.

Main Messages on Market-Based Approaches

Market-based risk management instruments have some clear advantages for managing food price risks in low-income countries, in efficient ways that allow voluntary participation. The evidence suggests that hedging potential is considerable in some cases, even when restricted to existing global futures and options markets. However, effective development and use of such markets is clearly not going to occur without active public policy support. Although there are many barriers to participation, especially for small-scale producers, traders, and processors, the public sector can play an important role in reducing these barriers and facilitating the use of market-based risk management instruments.

An option that could be adopted very quickly is the direct trading of market-based risk management instruments by public food marketing agencies to hedge government liabilities. Yet this is a risky venture for the public sector. Such trading requires not only considerable information and analytical capacity, but it is subject to the same problems of inefficiency and rent seeking that have plagued direct public intervention in food markets in the past, especially when there is no credible commitment regarding how the gains will be spent (and the losses financed). A preferred strategy is to encourage the private sector to use these markets by making long-run investments in the standard public goods that create an enabling environment for finance and risk markets, including grades and standards, credit market development, communication systems, market intelligence systems, regulations, and support for local or regional commodity exchanges and insurance products. There may also be a role for policy support of market intermediaries that provide access to risk management markets for small-scale operations, particularly when these markets are just beginning to develop. Perhaps most important, governments can provide a predictable policy environment that does not destroy the incentives for private individuals and firms to trade market-based risk management instruments.

COUNTERCYCLICAL SAFETY NETS TO PROTECT THE POOR AND VULNERABLE

Because of the perceived risks involved in eliminating consumer subsidies or experiencing large price spikes under liberalization, safety nets are generally

required to protect the poorest and most vulnerable groups of the population. The role of safety nets within the context of a market-based approach to managing food price risk and instability may be very important in providing reassurance that the poorest segments of the population will be protected in the transition away from state-dominated food distribution. Governments have been toppled by food riots often enough for the threat of such an occurrence to jeopardize attempts at reform.

Most public safety net programs in low-income countries are "pro-cyclic" in the sense that public resources are most available when they are least needed. As mentioned, resources to procure grain for food aid programs are most plentiful in good harvest seasons and least available in drought years (Hicks and Wodon 2001). This means that in times of stress most developing countries will be less able to target income or food to the poor without assistance from external donors.

In countercyclical safety net programs, budgets feasibly can be scaled up in times of need and scaled back when the need passes (Alderman and Haque 2005). Countercyclical safety net programs are likely to be very important for governments seeking to eliminate or reduce the costs of price stabilization policies. They provide the means to transfer cash or in-kind income to households and communities, and they serve as insurance against variable income streams in response to climatic and other shocks. The incorporation of an insurance function into the design of safety net programs recognizes that injecting food into markets is often an inadequate

means to protect the livelihoods of the rural poor when shortfalls in food availability are accompanied by shortfalls in purchasing power (Sen 1981).

Successful countercyclical programs require that additional resources kick in on a timely basis, that they are well targeted to the most vulnerable, and that they support and do not undermine market development. Current public safety net programs for the chronically poor can provide a scaffold to scale up implementation and coverage when needs are relatively high (Alderman and Haque 2005). Effective design of countercyclical safety nets also requires that they can be scaled back after a crisis.

The timely availability of funds is likely to be the most critical element for a countercyclical safety net program to function well. Weather-based triggers for activating budgets may be one way to shorten the time between identifying the need for transfer programs and implementing them. As discussed below, when food aid is anticipated but expected to arrive later than desired, the use of emergency reserves (physical or financial) can help provide timely assistance.

Domestically resourced programs are subject to the "Samaritan's dilemma," which is that governments may not devote as much attention or resources to developing effective national programs if international donors and humanitarian organizations are perceived to be ready to assist if a food crisis occurs (Gurenko and Lester 2004; Alderman and Haque 2005). Indeed international financial institutions already provide a number of such programs, many on concessional terms (box 7.5). Attention

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Box 7.5 Emergency Assistance Funds from International Financial Institutions

Effective implementation of countercyclical nets requires timely access to financial resources in kind or in cash in the event of a severe shock, such as a world price spike or a widespread natural disaster. International financial institutions have set up a variety of mechanisms. These include:
- The International Monetary Fund's (IMF's) Compensatory Financing Facility, which is especially designed to facilitate food imports during sharp changes in global prices. This facility was not widely used because of the requirement to

prove the temporary nature of the price shock and the absence of concessionality.
- The IMF's Poverty Reduction and Growth Facility, which has more of a grant element but is restricted to low-income countries.
- Support under the Emergency Assistance and Natural Disasters window of the IMF, which has a concessional element for eligible members of the Poverty Reduction and Growth Facility.
- Emergency Recovery Loans of the World Bank, which include quick disbursing elements.

Source: Alderman and Haque (2005).

to moral hazard problems of this type must be addressed in the implementation and management of effective countercyclical safety net programs.

Safety net programs must be capable of targeting benefits effectively to the poor and excluding others, for two reasons. First, to the extent that those with effective demand for food receive free food through safety net programs, markets will experience depressed demand, with the potential to exacerbate price instability and undermine long-run market development. Second, because the resources available for safety net programs are limited, such programs must be able to prevent benefits from spreading to those who are relatively less poor.

In certain instances, the ability to cost-effectively target safety net programs can be enhanced through the distribution of "inferior" or "self-targeted" commodities, which are important in the diets of poor people and are also consumed disproportionately by them (Jayne and others 1999; Gutner 2002). Examples of self-targeted goods include unrefined wheat flour in countries such as Pakistan and the Arab Republic of Egypt, and yellow maize in eastern and southern Africa. Moreover, by supporting the operation of marketing channels for self-targeted commodities, low-income consumers can rely on the market to a greater extent for their food needs, thereby reducing the magnitude of resources required for targeting the needy through administered food assistance programs.

Finally, safety net programs must be able to support market development in the long run while protecting the poor in the short run. Public works programs, such as food-for-work programs, are an important type of safety net with the potential to help build markets through the creation of roads and other forms of market infrastructure. These programs are self-targeted to the extent that the wage rate is set below the market wage, although some research has shown that even relatively well-off households may benefit from enrolling members in public works programs if the opportunity cost of their time is low (Barrett and Clay 2003). Some of these programs can also be combined with efforts to build market demand, such as the "input for asset" program in Malawi, which pays for the construction of roads and other public works, partly with vouchers to purchase fertilizer, or the Ethiopian safety net program, which is switching from food-for-work to cash payments, partly to support domestic market demand for grains.

VARIABLE TARIFFS TO MANAGE WORLD PRICE SHOCKS

Variable tariffs can be used as a short-run policy in food-importing countries to insulate domestic food markets from large world price shocks. The challenge with such policies is to manage the tariff level in a way that allows domestic prices to track world prices in the long run and that maintains the private sector's incentive to participate in international trade. The historical tendency to manage variable tariffs in a very discretionary way makes private-sector planning difficult and opens the programs to capture by vested interests, especially large-scale farmers. If variable tariffs are used, therefore, rates should be set according to well-specified rules rather than discretion.

Variable tariffs work best for imposing a floor price in food-importing countries because the tariff can be raised in the event of an extreme drop in world prices. Foster and Valdes (2005) suggest that the floor price should be based on the cost of production in the most efficient exporting country, to minimize risks of encouraging inefficient domestic production. Other countries, such as Chile, have used a fixed departure from a moving average border price as the trigger. Unless the tariff is already high, variable tariffs do not address effects of price spikes on consumers, and because high tariffs on food grains are sources both of inefficiency and higher inequality (the poor are penalized), they are not usually a desirable option. Nor are variable tariffs appropriate for price extremes generated by domestic shocks in countries that operate in wide bands between import and export parity. Furthermore, under current World Trade Organization (WTO) rules, the scope for variable tariffs is limited to the bound tariff (the tariff level declared to the WTO), although proposals are being discussed to allow variable tariffs as a safeguard to developing countries that import food.[29] Finally, if countries are to liberalize and encourage regional trade, variable tariffs have to be agreed at the regional level, as implemented in the Andean zone.

In sum, variable tariffs have some scope to protect producers from extremely low prices in food-importing countries, but they require very open and transparent rules that would preferably be monitored by the WTO to prevent abuse and political patronage (Foster and Valdes 2005). They should be used only for a very small number of "strategic commodities" that have well-defined international reference prices. Finally, it is clear that

variable tariffs are of limited value for protecting against price spikes, a goal that is often the main concern of food-importing countries.

AN ARM'S-LENGTH FOOD RESERVE TO MANAGE DOMESTIC SHOCKS?

The last and most difficult step for countries undergoing market liberalization and privatization is how to deal with public grain reserves. Countries maintain such reserves for three major reasons (NEPAD 2004):

1. Emergency reserves for a major natural disaster, such as a severe drought, especially in eastern and southern Africa, usually linked to food aid donations
2. Food security reserves for servicing both emergency relief and a public distribution system (mainly in Asia) for the chronically poor, again often supported in part through food aid donations
3. Buffer stocks, now often known as strategic reserves, aimed at smoothing prices, but also serving as emergency relief and supporting public distribution systems, if they exist

Clearly the first two objectives, which operate largely on the consumer side of the market, are not focused on stabilizing prices per se, although they do target food security for vulnerable consumers. In principle, a small and well-managed stock could provide "degrees of freedom" in responding to a crisis until commercial imports and food aid can arrive. To the extent that these reserves are supplied from local grain production, they involve public procurement. A tendering system is the most effective approach, but the size of such an operating reserve is generally too small to influence national markets and therefore unlikely to be a feasible tool for stabilizing prices. In some countries, such as Ethiopia and Uganda, food aid operations have reached a level that they can influence markets either negatively (for example, through the untimely release of food aid into a surplus market or the untimely local procurement of food aid) or positively (for example, when strategic procurement helps develop markets or stabilize prices) (Coulter 2005). In practice, social objectives could be combined with procurement by, for example, requiring that tenders be supplied from more remote, poorer regions that have surplus grain but thin markets. Efficiently run public procurement could provide a much-needed stimulus for competition and demand in such markets. It is important, however, to recognize the trade-offs between efficiency and social objectives.

On a larger scale, many countries in Africa, after the closure of public food marketing agencies, still attempt to operate a buffer stock to support prices in years when harvests are good and to dampen price rises in years when they are poor, or even to ride out extreme prices in world markets. Of course, these same reserves also serve during crises and for public food distribution systems. Despite their appeal, the record of such operations is not encouraging (box 7.6), and consumers often face greater instability in food prices and availability when such strategic reserves are used, as seen in Malawi (see chapter 5).[30]

Box 7.6 NEPAD's Sobering Findings on Strategic Reserves

A comprehensive review by NEPAD (2004) captures the record of food reserve agencies as follows:

In southern Africa, continued attempts to use strategic grain reserves to help stabilize cereal prices for both producers and consumers have undermined market incentives for private traders to perform normal arbitrage functions that could otherwise have satisfied governments' food security objectives in most years. As a consequence, small farmers have often been penalized for producing a surplus crop by falling prices and lack of markets. This has led them to reduce plantings with subsequent adverse impact on the overall production and grain availability situation in following years. At the same time, consumers have also faced greater instability in grain markets, with respect to both physical quantities available and price. In most cases, therefore, experience with strategic grain reserves in this part of Africa up to now has been less than satisfactory.

Source: NEPAD (2004:34).

The case for strategic reserves is strongest in land-locked countries that are close to self-sufficiency in a major staple, and where reliance on trade to equalize supply and demand can potentially lead to large price swings (from export to import parity). But even here, timely access to financial resources is needed for reserves to operate effectively, and any grain reserve must be combined with a financial reserve (usually in foreign currency). In coastal countries, the financial reserve should be all that is needed (Poulton and others 2005). For example, Senegal depends solely on a dedicated financial reserve for drought emergencies (NEPAD 2004). A professionally managed reserve could also take out insurance or hedge to reduce financial exposure.

Conceivably some of the problems with reserves could be surmounted by setting up an arm's-length, professionally managed reserve along the following lines:

- Central-bank type autonomy, with complete independence from political processes, and with clear and well-defined objectives
- Highly professional management, with a good information system and analytical capacity
- Flexibility to hold the combination of grain and financial reserves that minimizes costs within acceptable levels of risk
- Clear and open rules for market intervention and transparency in its interventions
- Access to a fund or financial markets, to provide flexibility to respond in an emergency

These fairly strict requirements have proven very difficult to implement. Whether the development of an arm's-length, professionally managed reserve can be achieved in practice is unclear and would vary by country and region. Such a reserve is also costly, occupying resources that have significant opportunity costs.

8

Managing the Policy Dialogue

There is little doubt that the slow progress in reforming food markets reflects weaknesses in how the World Bank, other donors, and reformers within countries have managed the policy dialogue. Broad recommendations on privatization and public-sector withdrawal have been less successful in the case of food markets relative to export crop markets, since both producer and consumer interests are at stake, involving the welfare of a large cross-section of the population. In a few cases a "big bang" approach was implemented, as when Mexico committed to a free trade agreement with the United States and Canada, but even there, reforms in maize marketing remained partial after Mexico built safety nets and "sweeteners" into the reform program on the consumer and producer sides (Avalos-Sartorio 2005).

The large number of stakeholders and the political sensitivity of food market reforms suggest that a time-intensive, resource-consuming process of policy dialogue is essential to design a phased sequence of reforms that is broadly acceptable. Vested interests in public parastatals as well as private agencies often stall reforms. Politicians are extremely cautious in implementing food market reforms if they perceive that they will lead to more volatile food prices.

Two somewhat different approaches to managing the policy dialogue are evident in Pakistan and Malawi. In Pakistan, after more than two decades of donor-commissioned studies and recommendations to liberalize wheat markets, the policy dialogue has advanced considerably over the past year, facilitated by a resident external adviser to the Federal Minister for Food and Agriculture (box 8.1). The key to success has been a series of structured meetings among key policymakers in each province and at the federal level, followed by a national meeting (Faruqee 2005). Broad consensus has been established for moving forward and giving a much larger role to the private sector. Reforms will still be partial, however, and key details remain to be resolved regarding the management of a strategic reserve and the maintenance of a minimum support price.

In Malawi, the policy dialogue on maize market reforms has been facilitated by a Poverty and Social Impact Analysis (PSIA), implemented over the past two years (box 8.2). As in Pakistan, in Malawi the new approach followed a continuing stalemate between donors and the government of Malawi on reforming the food marketing parastatal. Participatory workshops were a central part of the process to break the stalemate, although a much wider range of stakeholders

Box 8.1 Managing the Dialogue on Wheat Policy in Pakistan

International financial institutions have long but unsuccessfully pressured Pakistan to reform wheat markets, often by attaching conditions to policy loans. Although the ration shop system of distributing wheat to consumers was disbanded in the 1980s, vested interests within the government and its parastatals, as well as in private businesses (especially wheat millers), stalled more extensive reform. A further complication was that wheat-surplus provinces, notably the Punjab, had different interests from deficit provinces, such as North West Frontier Province. Adding to the pressure was the fact that wheat subsidies in the largest province, Punjab, exceeded the sum of all other expenditures on the agricultural sector, crowding out desperately needed investments in roads, irrigation, and research and development. Another major fiscal issue was the high variability in subsidies from year to year, depending on the harvest and import prices.

In 2002, the federal government introduced limited reforms, notably a seasonally adjusted wheat procurement and release price, which provided needed space for the private sector to operate. In 2004, however, the government of Punjab, unable to procure its targets at the announced price, once again restricted the movement of wheat out of the province, sparking a sharp confrontation with deficit provinces.

An intensive dialogue, initiated in 2004 by the advisor to the federal minister for food and agriculture, involved all relevant public decision makers in ministries and parastatals at the federal and provincial levels. They focused on:

- Clarifying the objectives of the current policy, especially the conceptual distinction between the minimum support price and the price that was set to procure stocks for the strategic reserve
- Distinguishing the stocks needed for the strategic reserve from those needed to manage the public food distribution program
- Targeting remaining consumer subsidies on the poorest
- Moving toward a price band and away from fixed producer and consumer prices
- Agreeing to ban restrictions on moving wheat across provinces
- Developing a strong crop forecasting and information system for public and private decision makers
- Phased downsizing of public agencies involved in wheat markets.

While many details are being worked out and the policy has yet to be implemented, the dialogue is promising.

Source: Faruqee (2005).

Box 8.2 Key Elements of a Poverty and Social Impact Analysis

The Poverty and Social Impact Analysis (PSIA) was introduced by donors and international financing agencies as a central element of the national dialogue on sensitive policy reforms. The analytical process gives special attention to participatory processes of policy discussion as well as analytical studies to identify the winners and losers from prospective policy reforms. In practice, a good PSIA:

- Is undertaken early, to inform the way that reforms are designed
- Consults a wide range of stakeholders, to foster broad ownership

- Uses local expertise as much as possible, again to foster ownership
- Employs a diverse toolbox that mixes quantitative and qualitative methods
- Uses transparent assumptions and processes
- Addresses risks to policy implementation.

For more details on the PSIA approach and studies that have already been completed, see www.worldbank.org/psia.

Source: Nucifora and Lisulo (2005).

was involved in Malawi than in Pakistan (Nucifora and Lisulo 2005). The Malawi case has also focused much more on analyzing who will win or lose from the reform. The dialogue resulted in broad agreement that the private sector should handle maize marketing in urban areas and in rural areas with good infrastructure but that public intervention is needed over the medium term to serve producers and especially consumers in more remote areas. Details on how to support this "social market" are still being formulated. Another issue is that Malawi has a separate food reserve agency (aside from the food marketing parastatal), whose performance has been widely questioned but was not analyzed in the PSIA (see Bird, Booth, and Pratt 2003 and chapter 5).

Of course, participatory stakeholder approaches to policy reform do not guarantee that a transparent discussion of stakeholder interests will ensue or that consensus will be achieved on the way forward. Stakeholders have asymmetric information and knowledge about the likely effects of reforms. Knowledgeable stakeholders who stand to lose from reforms can attempt to manipulate the public discussion and turn opinion against reform, which occurred during maize market reforms in Kenya in the 1990s and in Zimbabwe after the mid-1990s. Improvements in policy and the use of public expenditures cannot be ensured through such a process.

The main messages from these ongoing experiences, as well as others (Faruqee 2005; Nucifora and Lisulo 2005), can be summarized as follows.

- Much more time and resources must be invested in the policy dialogue over sensitive reforms such as those involving food marketing parastatals. It is especially important to build trust among key stakeholders.
- Both standard economic analytical tools and participatory approaches are important in building the evidence for the dialogue.
- Particular attention should be given to sequencing reforms over time, and "second-best" outcomes will be the norm. Phasing reforms to score quick wins is one way to build support for further reforms.
- Donors should provide a consistent and coherent message on the reform process (Bird, Booth, and Pratt 2003). While donors and external experts can support valuable analytical studies, local champions and local expertise are essential for success.
- It is important to put in place a system to monitor and evaluate implementation of the reforms, paying special attention to monitoring price movements.
- Reforms are best implemented in a good harvest year, but the acid test for sustainable reforms is their performance following a bad harvest or global price shock.

9 Conclusions and Recommendations

Food price risk and instability are perennial issues that have dogged food policy debates for decades. Their persistence is understandable, given the continued importance of food staples as a wage good, their high share of national income and expenditures in low-income countries, and political sensitivities to sharp changes in food prices. Since the 1990s, these issues have taken on new urgency in the context of market liberalization, suggesting that the standard policy responses are inadequate.

The reform of food markets, particularly public food marketing agencies, has been very slow in many countries. In several cases, reforms have been reversed. The relationship between food market reforms and food price instability is especially controversial. Some are reluctant to liberalize food markets because of fears about the potential impacts on food price instability, or out of the conviction that food prices have become more unstable in countries that have liberalized. Others contend that "halfway" reforms create the worst of all possible worlds, in which the private sector is encouraged to operate in an environment where governments continue to intervene in discretionary and unpredictable ways that make prices even less stable.

Over the years, commodity price stabilization and risk management have received considerable attention from researchers and policymakers in industrial- and developing- country settings. This study was motivated by the need to revisit the problem of food price instability and risk in low-income countries and investigate the benefits and costs of alternative policy responses. In particular, the study aimed to provide guidance on how to make the transition from state-dominated markets to private markets in ways that do not expose producers and consumers to the risk of unacceptable price spikes and collapses. It has addressed five key questions:

1. What are the sources and magnitudes of food price shocks?
2. What are the magnitudes (actual and potential) of the economic and social costs stemming from food price instability in low-income countries?
3. What is the status of food market reforms, and what can be learned from the experience to date?
4. How can countries sequence reforms in ways that promote efficient market development and protect the interests of the poor?
5. What are appropriate policy responses to food price instability and risk in a liberalized market environment?

HOW BIG IS THE PROBLEM, AND WHO SUFFERS MOST?

Country context defines the problem. Food policy decisions must be tailored to the individual circumstances of each country but, as a starting point for identifying an appropriate policy response, countries can be grouped roughly according to common needs and risks. A simple framework for classification focuses on low-income countries and regions in which food consumption is dominated by one staple: rice in Asia and Madagascar, wheat in Pakistan and the Middle East and North Africa, white maize in eastern and southern Africa, and millet/sorghum in Sahelian countries of West Africa. These are the countries and regions where the poor are most exposed to sharp movements in the prices of food staples, especially spikes in the prices paid by consumers. These countries were further classified according to their potential exposure to price shocks from domestic climatic events and to shocks generated by world grain markets.

Based on this classification, rice and wheat importers, especially the least developed (examples include Madagascar, Bangladesh, and Yemen) are most exposed to world price shocks. Many other Asian and middle-income countries are exposed as well, but their improved infrastructure and foreign exchange reserves have placed them in a much better position to handle such shocks than three decades ago, when many public food marketing agencies were established. Landlocked countries in southern Africa that depend on maize and, to a lesser extent, other landlocked African countries (such as Ethiopia and some Sahelian countries) are most exposed to domestic sources of shocks. Food production in these countries is highly variable, and their capacity to operate on world markets is limited by high transport costs and foreign exchange constraints.

The first conclusion—obvious but too often overlooked—is that food policy decisions and market reforms are highly specific to their context. More attention needs to be paid to a country's particular stage of development, food consumption patterns, agroclimatic factors, geographical situation, and institutional setup in designing appropriate food policies.

A country typology hides considerable heterogeneity within countries between rural and urban areas, regions, and households. But generally the consumption patterns of urban households, even poor households, have become more diversified over time, giving them more flexibility to handle sharp spikes in the price of the dominant food staple. In rural areas, the empirical finding that emerges consistently in most parts of the developing world is that a majority of households are net food buyers, while a relatively small minority of wealthier households are grain sellers. The poor, who are overwhelmingly net food purchasers, suffer disproportionately from high food prices. Among producers, the impacts of low food prices are at least partially offset by negatively correlated production variability.

This analysis leads to a second major conclusion: Food policy should generally emphasize the impacts of unstable food prices on consumers—rural and urban, and especially the poorest and most vulnerable—rather than on producers.

How significant are food price shocks? At the global level, variability in world grain prices remains significant, with coefficients of variation around trend of 20 to 30 percent for rice, wheat, and white maize. Although there is no evidence that variability has increased (indeed, prices were most unstable in the 1970s), there is concern that changes in world markets, especially reductions in the stocks held by major producers (China, the United States, and the European Union) and rapid growth in demand in Asia, may provoke higher and more unstable prices in the future.

The evidence on the magnitude and frequency of price instability in domestic food markets, actual and potential, is limited. In general, producer prices for wheat and maize in importing countries have been more stable than international prices, reflecting difficulties in transmitting international prices into domestic markets, as well as continuing policy interventions in many countries that insulate domestic markets from world prices. There is no convincing evidence to date that domestic food price instability has increased over time in the sample of countries reviewed.

Domestic price instability tends to be highest in two groups of countries. The first group comprises Latin American countries where macroeconomic shocks, especially sharp exchange rate devaluations, have resulted in highly unstable prices in a number of cases. The second group is African countries, especially landlocked countries where the wedge between export and import prices is high because of high transport costs and poor market infrastructure. The high import-export parity wedge, com-

bined with high domestic production variability, increases the impact of domestic shocks, especially drought, on prices. A contributing factor, particularly in Southern Africa, is the uncertainty created by unpredictable government interventions in food markets and imports.

Under a full market liberalization scenario, food price shocks, whether from global or domestic sources, are potentially significant in many situations. For example, in Ethiopia the price wedge between import and export parity has allowed maize prices to fluctuate from about US$50 to nearly US$250 per ton in recent years in Addis Ababa, and probably more in remoter regions. Likewise, countries depending on rice imports have faced world export prices falling from US$340 per ton in 1996 to a low of US$170 per ton in 2001, and rebounding to more than US$300 per ton in 2005.

What are the costs of price instability? The costs of unstable food prices can include the loss of economic efficiency, detrimental impacts on the welfare of the poor (including undernutrition and reduced survival), and negative macroeconomic externalities that retard economic growth. There is little consensus and generally weak evidence on the magnitude of these costs. The effects of unstable food prices on economic efficiency are probably not large in most cases. The most persuasive cases for the negative effects of high food prices can be made for effects on (1) household food security and nutrition and (2) macroeconomic performance. These costs could be significant in certain situations—for example, in the poorest countries with poor infrastructure, weak capacity to import, dependence on a single dominant staple, and susceptibility to drought—all characteristics of several landlocked countries in Africa.

WHAT DO WE LEARN FROM POLICY REFORMS?

The record of food market reforms in low-income and even many middle-income countries is mixed at best. Some countries, such as India, have maintained their old parastatal systems more or less intact, but mounting costs have made most of these systems unsustainable. Other countries, such as Bangladesh, Mali, and Mozambique, have introduced and sustained significant reforms that enabled them to weather a major natural disaster at a much lower cost than in the past and with tolerable levels of price instability. Notably, these countries

have exploited trade opportunities, especially regional trade, as the main mechanism for stabilizing domestic grain prices.

But what about the many countries that are stuck halfway in the reform process, hovering between old parastatal models and private, market-led approaches? In this situation, discretionary interventions to meet an emergency (or even just a declaration of the intention to intervene) have been especially destructive to incentives for private-sector participation.

Other important lessons have been learned from the varied experience with market reforms. Many countries paid insufficient attention to designing an orderly sequence of reforms that systematically increased the role of the private sector and built confidence in a market-based approach. Nor was sufficient attention given to political economy considerations (such as vested interests that maneuver to maintain the status quo) and to designing a reform program that takes account of these realities.

MOVING FORWARD: BROADER POLICY OPTIONS

Policies are chosen within a set of constraints formed by the political system and by limitations on availability of public funds. These constraints force governments to make explicit tradeoffs in allocating public expenditures, and it is imperative that these tradeoffs are made in ways that enhance the long-run performance, growth, and stability of the food sector and the economy as a whole.

This review highlights a number of policy options for moving forward, recognizing that it is especially difficult to make generic recommendations for such a country-specific and complex topic. One general recommendation is that food policy decisions, rather than focusing on price stabilization options per se, should take a holistic approach to food security in which long-run productivity growth and market development constitute the first priority. This leads to four specific recommendations, summarized below.

1. Problems of food price instability and food insecurity need to be addressed in a holistic framework that includes:
   - Measures to improve overall productivity of food staples, especially investments in research and development and irrigation

- Measures to reduce the severity of domestic shocks caused by climatic events (such as measures to promote irrigation or crop diversification)
- Measures to improve the overall efficiency of markets, including investments in transport and communication infrastructure, storage, information systems, market regulations, and institutional arrangements that improve coordination along the market chain
- Measures to mitigate the impacts of shocks, including market-based measures (such as forward pricing and weather insurance) as well as countercyclical safety nets.

The corollary of this recommendation is that direct public interventions in food markets to manage food price risk should be a last resort (see below).

2. Resources should be reallocated from short-run, "fire-fighting" interventions to manage food prices to investment in long-run market and private-sector development, including incentive frameworks, market institutions, and infrastructure in line with the recommendation above. Nonetheless, even investments in market development must be sequenced in ways that confer measurable gains in the short to medium term. Public-private partnerships (for example, through farmer and trader associations) to develop production and market information systems, storage, and market networks are often the first priorities for improving food sector performance.

3. Liberalization of trade, especially the promotion of regional trade, is one of the most effective "quick wins" for reducing food price volatility in small and medium-sized countries. Liberalization of trade shifts a country's exposure away from domestic shocks and toward global price shocks, but global shocks are usually lessened if trade with neighboring countries is encouraged. Regional trade requires action on a number of fronts, including long-run investments in infrastructure, but the development of (a) consistent rule-based policies to lift discretionary export bans and import restrictions, (b) smooth border-clearing procedures, and (c) harmonized regulations, such as phytosanitary rules, would go a long way toward creating the incentives for private traders to engage in regional trade.

4. Sequence market reforms in a consistent manner that creates space for the private sector to operate. "Big bang" approaches to market reform have rarely worked in practice. For markets to develop over the long run, including regional markets, consistent progress must be made in opening space for the private sector. More analytical work and policy dialogue will provide a better basis for designing a logical, sequential program of reforms. Finally, governments need to implement the agreed program in a predictable and consistent manner. A generic sequence that would gradually increase the role of the private sector includes:

- Eliminating blanket subsidies and revising remaining subsidies in ways that level the playing field for the private sector and target the poor.
- Removing remaining restrictions on grain movement within a country and reducing restrictions on grain imports and exports.
- Moving away from fixed procurement and release prices toward seasonally adjusted prices and price bands.
- Tendering remaining public procurement, imports, and even storage to the private sector, using a highly transparent process to increase efficiency, reduce rent-seeking, and build private-sector capacity.

SPECIFIC POLICY OPTIONS FOR MANAGING PRICE INSTABILITY AND RISK

Within an overall public policy strategy for food systems that emphasizes the transition to private markets and long-run market development, there are roles for the public sector in enhancing price stability and managing food sector risks. Two of these will be a standard part of the toolkit of most food security strategies: (1) piloting and facilitating the adoption of various market-based risk management instruments and (2) countercyclical safety nets. Two others may have a role in certain situations and when accompanied by specific safeguards to ensure "arm's-length," rule-based management: (3) variable tariffs and (4) strategic reserves.

Market-based risk management instruments. Several risk management instruments show considerable promise in managing food price risks, including facilitation of private storage (warehouse receipt systems), futures and options markets, and weather-

indexed insurance. These alternatives are rarely used in low-income countries, partly because the public sector dominates food markets and partly because the enabling conditions are lacking, such as access to finance, information systems, communication systems, market regulations, and capacity.

The major focus of the public sector should be to create an environment that facilitates the private sector's adoption of these instruments, especially in the following ways.

- Warehouse receipts, for use initially by larger-scale farmers, processors, and traders, and over the longer term by the small-scale sector. Warehouse receipts have much potential to reduce risks from seasonal price fluctuations, develop finance markets, encourage investment in storage, and eventually (when widely adopted) to reduce both seasonal and interannual price fluctuations. They cannot be implemented if an appropriate regulatory and business environment is lacking, however.
- Futures and options using existing global markets, for use mainly by large-scale traders and processors and strong intermediaries, such as well-developed farmer or trader associations, to reduce exposure to risks from global markets. These alternatives are already available where the basis risk is low, which appears to be the case for wheat and white maize for many countries, using U.S. and South African futures markets.
- Weather-indexed insurance for use by farmers, safety net programs (see below), and (potentially) consumers. While not designed for price risk management per se, weather-indexed insurance can mitigate the impacts of price spikes or climatic shocks. Successfully piloted at the farm level in India and Mexico, weather insurance can be used more widely where weather indices are good proxies for crop losses, and especially if domestic insurers can reinsure on global markets.

The public sector should support the development of a basic enabling environment by conducting the analytical work and building the capacity to pilot and scale up programs that promote the development of financial systems, communication and information systems, regulations, and an appropriate business climate.

Some recent discussions have also noted the potential for the public sector to use market-based instruments to reduce exposure to risks from its own operations in food markets. Yet direct trading of futures, options, or insurance contracts by governments or public food agencies should be approached with extreme caution. Large government futures or options positions are not recommended for two reasons. First, even if the public sector is successful in using these instruments, the public sector is likely to undermine incentives for the private sector to use them. Second, given the poor record of public-sector interventions in food markets, there is little reason to believe that the public sector's use of market-based risk management instruments would be immune to the same inefficiencies and rent-seeking forces that have plagued conventional public food agency operations.

If governments do choose to become involved in direct procurement to manage a small strategic food reserve (see below), market-based risk management strategies may have a potential role in these operations. In such cases, options have distinct advantages over futures—first, because of their role as price insurance, and second, because purchasing options requires only a single, up-front premium, whereas futures can entail continuing margin calls if prices move unfavorably. Even when using options, an effective hedging strategy requires considerable investments in analytical capacity and a long-run commitment, otherwise hedging could add to risk rather than reduce it. The misuse of futures and options may expose governments to even greater fiscal risks and rent-seeking than conventional public-sector operations in food markets, unless special management safeguards are in place (see below).

Countercyclical safety nets. A second major priority for interventions to manage risks is to support the development of countercyclical safety nets in ways that are market friendly. Countercyclical safety nets, which kick in when high food prices or low production threaten household food security, are an integral part of any program to manage food price risks. Food aid and food-for-work programs remain the most important safety nets in many countries. In the past, however, untimely imports and sales of food aid, along with poor targeting, often undermined market development. Food aid and other safety net programs can support long-run market development by:

- Converting from food to cash transfers where food markets already function reasonably well
- Scaling up local and regional procurement of food aid, perhaps including the maintenance

of a small and well-managed emergency reserve, but ensuring that the timing of food aid procurement does not aggravate price instability

- Incorporating rainfall insurance into safety net programs to enhance their ability to trigger timely and better-targeted responses to a drought
- Better targeting of food aid through improved information systems and the use of self-targeting approaches, including "inferior" grains
- Integrating safety nets with market development activities, such as the use of food aid to construct local market infrastructure.

Variable tariffs. Under certain circumstances, variable tariffs can be used to manage downside price risks to producers from exposure to global markets. To be effective, they should be triggered by well-defined rules to reduce political capture and be highly transparent in their operation. Technically, their use also must be approved by the WTO, and indeed a preferable outcome would be for the triggers and monitoring of their implementation to be subject to WTO oversight to maintain maximum transparency.

Technically, variable tariffs could also be used to reduce risks from price spikes in global markets, but tariffs must be high enough initially that they can be lowered when world prices rise sharply. Given that high tariffs on food grains are generally undesirable for both efficiency and equity reasons (most poor households, including rural households, are net food purchasers), variable tariffs are unlikely to be useful for managing world price spikes.

Strategic reserves. Many countries still maintain publicly owned reserves to reduce food price instability. In a liberalized market economy, the primary reason to maintain such reserves should be a targeted food distribution scheme (if there is one), although in a few cases reserves can be maintained to cope with emergencies (especially in landlocked countries with poor infrastructure). In some cases, reserves may be large enough to influence domestic market prices, and judicious use of these reserves may help reduce the impact of domestic shocks on food prices, especially where there is a large wedge between import and export parity prices. Critical safeguards must be in place to ensure that operations of food reserve agencies do not destabilize markets, however, including (1) arm's-length, "central bank"–type autonomy, (2) highly professional management and analytical capacity, (3) strict rule-based market operations to meet a narrowly defined objective, and (4) tendering of operations, including storage, to the private sector.

THE IMPORTANCE OF LOCAL CIRCUMSTANCES

Returning to the country typology discussed earlier, it is clear that food policy design and approaches to managing food sector risks will vary widely, depending on each country's context. The overall priorities on productivity enhancement and market development are fairly generic; they apply in many contexts. However, quite different strategies will emerge across countries and regions in moving to sequenced reforms, creating space for the private sector, and addressing specific priorities for managing market risks. The Asian countries, in particular, still have a considerable reform agenda to open space for the private sector. Likewise the opportunity to apply various market-based risk instruments depends a lot on the extent that a country is exposed to domestic versus global shocks.

ENTRY POINTS FOR THE WORLD BANK

Food market reform and food security remain critical areas for Bank engagement. Interest in these issues is burgeoning in many countries, including those which have not yet embarked seriously on reforms and those which seem stuck halfway through the process. The Bank needs to revamp its analytical work in this critical area, paying particular attention to the following points.

Manage the policy dialogue better. Too often, the Bank's analytical work has proposed broad recommendations on market reforms but paid little attention to how those reforms should be sequenced. The "big bang" approaches generally have not worked, and part of the challenge in moving forward is to be alert for opportunities to move toward second- and even third-best options rather than waiting for the opportunity for full reform. Good analytical work must be combined with much more time- and resource-intensive policy dialogue that is attuned to political realities (for example, vested interests). Advice on food grain market reform will be more effective if it seeks wide stakeholder dialogue and

pays special attention to transitional and sequencing arrangements that mitigate the negative effects of policy changes on particular groups (van de Walle 2001; Bird, Booth, and Pratt 2003). The use of PSIAs to ensure wide buy-in and ownership in this delicate reform process is a step in the right direction and needs to be scaled up.

Pilot and evaluate new market-based instruments. The recent move by the Bank's commodity-based risk management group to analyze the applicability of market-based risk management instruments for food staples is providing encouraging results and should be scaled up. However, this work should focus on analytical support and capacity building to facilitate adoption of these instruments by the

private sector and promote the emergence of necessary institutions and intermediaries. Extreme caution should be used in promoting use of these approaches by public food marketing or strategic reserve agencies.

Support activities at the regional and global level. The Bank's analytical work can play an important role in informing global actors in food markets on the use of safeguard measures such as variable tariffs by developing countries. More importantly, this report has highlighted the potential for regional trade as a mechanism to stabilize prices within a region, which raises a huge agenda for analytical work and policy dialogue to reduce policy and institutional barriers to trade in nearly all regions.

Appendix 1
List of Workshop Papers

Alderman, H., and T. Haque. 2005. "Countercyclical Safety Nets for the Poor and Vulnerable."

Avalos-Sartorio, B. 2005. "What Can We Learn From Past Price Stabilization Policies and Market Reform in Mexico?"

Badiane, O., and D. Resnick. 2005. "Regional Trade Liberalization and Domestic Food Market Stabilization in African Countries."

Coulter, J. 2005. "Making the Transition to a Market-Based Grain Marketing System."

Cummings, R. W., Jr., S. Rashid, and A. Gulati. 2005. "Grain Price Stabilization Experiences in Asia: What Have We Learned?"

Dana, J., C. L. Gilbert, and E. Shim. 2005. "Hedging Grain Price Risk in the SADC: Case Studies of Malawi and Zambia."

Dawe, D., and Timmer, C. P. 2005. "Managing Food Price Instability in Asia: A Macro Food Security Perspective."

Faruqee, R. 2005. "Reforming Wheat Policy in Pakistan."

Foster, W., and A. Valdes. 2005. "The Merits of a Special Safeguard, Price Floor Mechanism under Doha for Developing Countries."

Gabre-Madhin, E. 2005. "Getting Markets Right."

Hazell, P., G. Shields, and D. Shields. 2005. "The Nature and Extent of Domestic Sources of Food Price Instability and Risk."

Ibarra, H., U. Hess, J. Syroka, and A. Nucifora. 2005. "Use of Weather Insurance Markets for Managing Food Supply Risk: Malawi Case Study."

Jayne, T. S., G. Tembo, and J. Nijhoff. 2005. "Experiences of Food Market Reform and Price Stabilization in Eastern and Southern Africa."

Mitchell, D., and J. Le Vallee. 2005. "International Food Price Variability: The Implications of Recent Policy Changes."

Myers, R. 2005. "Costs of Food Price Instability in Low-Income Countries."

Nucifora, A., and A. Lisulo. 2005. "Lessons in Managing Policy Dialogue in Malawi: Reforming the Agricultural Development and Marketing Corporation."

Poulton, C., J. Kydd, S. Wiggins, and A. Dorward. 2005. "State Intervention for Food Price Stabilisation in Africa: Can it Work?"

Sarris, A., P. Conforti, and A. Prakash. 2005. "The Use of Organized Commodity Markets to Manage Food Import Price Instability and Risk."

Papers presented to the international workshop "Managing Food Price Instability in Low-Income Countries," February 28 to March 1, 2005, Washington, DC. All papers are available at http://www.passlivelihoods.org.uk/default.asp?project_id=240&nc=4921.

Appendix 2
Detailed Data for the Macro-Typology of Countries

This appendix provides empirical background on the basis for grouping 25 developing countries according to their vulnerability to global and domestic food price shocks (see tables 2.2 and 2.3).

Table A.1 Country-specific Variables Used to Development the Country Typology

Country	Diversity Index of Food Consumption, $\Sigma(S_i)^2$ (2002)	Food Aid as a Share of Cereal Utilization, 1999–2003	Average Annual Cereal Imports to Foreign Reserves, 1994–2003
Bangladesh	0.77	1.5	29.7
Burkina Faso	0.55	1.5	25.6
Cambodia	0.81	1.0	4.6
Cameroon	0.18	0.4	53.8
Chile	0.54	0	2.2
Côte d'Ivoire	0.23	0.8	26.1
Egypt, Arab Repub. of	0.36	0.1	11.8
Ethiopia	0.22	13.0	36.2
Ghana	0.21	3.0	23.1
India	0.40	0.1	0.3
Indonesia	0.54	0.5	7.9
Kenya	0.43	9.1	26.9
Madagascar	0.47	1.1	21.2
Malawi	0.48	6.8	36.1
Mali	0.35	1.2	8.1
Mexico	0.58	0	6.6
Morocco	0.51	0.8	12.7
Mozambique	0.33	10.3	16.6
Nepal	0.33	0.6	2.2
Niger	0.80	1.5	65.6
Nigeria	0.25	0.0	9.6
Pakistan	0.61	0.6	11.0
Senegal	0.34	1.4	63.8
South Africa	0.42	0.3	8.9
Sudan	0.52	5.7	98.6
Tanzania	0.30	3.1	15.5
Uganda	0.22	6.6	8.6
Vietnam	0.82	0.2	0
Yemen, Repub. of	0.49	4.7	19.0
Zambia	0.56	9.5	26.7
Zimbabwe	0.51	9.9	30.6

Table A.2 Commodity-specific Variables Used to Develop the Country Typology

Country	Dominant Staple	Number of Years in 10 as Net Importer (Exporter)	Net Imports (Exports) of Dominant Staple as Percentage of Utilization	Net Imports of Food Staple as a Percentage of Total Exports	Cuddy-Della Valle Index of Production Variability
Bangladesh	Rice	10	2.5	3.1	5.0
Burkina Faso	Millet/Sorghum	3	–0.1	–0.0	12.0
Cambodia	Rice	10	1.5	0.6	5.0
Cameroon	Cassava	2	–0.0	0	2.0
	Maize	10	0.9	0.0	6.0
Chile	Wheat	10	24.5	0.4	11.1
Côte d'Ivoire	Rice	10	32.0	2.4	19.1
Egypt, Arab Repub. of	Wheat	10	47.4	3.2	2.2
	Maize	10	44.6	5.5	8.9
Ethiopia	Maize	9	0.7	0.3	12.6
	Wheat	10	39.2	15.7	8.5
Ghana	Cassava	–10	–0.2	–0.0	4.3
	Maize	5	–0.1	0.0	11.1
India	Rice	–10	–2.4	–1.7	7.0
	Wheat	3	–1.8	–0.2	5.4
Indonesia	Rice	10	3.7	0.9	1.6
Kenya	Maize	7	9.5	1.6	8.9
Madagascar	Rice	10	4.0	2.7	2.7
Malawi	Maize	9	6.9	6.5	21.6
Mali	Millet/Sorghum	3	0.3	–0.1	18.7
Mexico	Maize	10	20.1	0.5	3.7
Morocco	Wheat	10	41.8	3.9	46.3
Mozambique	Cassava	1	0.0	0.0	4.9
	Maize	10	16.4	6.4	11.1
Nepal	Rice	10	1.3	0.9	2.9
Niger	Millet/Sorghum	10	0.5	0.3	14.2
Nigeria	Millet/Sorghum	1	–0.1	–0.0	3.0
Pakistan	Wheat	7	6.6	2.1	5.5
Senegal	Rice	10	75.8	9.1	16.7
South Africa	Maize	1	–10.8	–0.4	20.3
Sudan	Millet/Sorghum	3	–1.8	–0.4	24.6
Tanzania	Maize	7	1.8	1.2	11.2
Uganda	Cassava	2	0	–0.2	13.7
	Maize	5	–0.2	0	8.2
	Plantains	0	0	0	1.9
Vietnam	Rice	–10	–12.5	–5.4	2.3
Yemen, Repub. of	Wheat	10	93.0	7.5	10.6
Zambia	Maize	8	10.5	2.4	30.6
Zimbabwe	Maize	3	–8.7	–0.1	40.9

Notes

CHAPTER 1

1. See, for example, Newberry and Stiglitz (1981); Myers (1988, 1992b); and Williams and Wright (1991).
2. See Tobey, Reilly, and Kane (1992); Reilly and Hohmann (1993); Antle (1995); Winters and others (1998); and Mendelsohn and Dinar (1999).
3. See Bates (1981); Toye (1992); Sahn, Dorosh, and Younger (1997); Jayne and others (2002); McPherson (2002); and Garcia Garcia (2004).
4. See World Bank (1994, 2000); Sahn, Dorosh, and Younger (1997); Kherallah and others (2002); and Dorward and others (2004).
5. See Barrett (1997, 1999); Reardon and others (1999); World Bank (2000); Sachs (2001); Jayne and others (2002); and Dorward and others (2004).
6. In eastern and southern Africa, for example, Zambia, Kenya, Zimbabwe, and Malawi have either retained or reinstituted parastatal marketing boards to stabilize prices, hold buffer stocks, and achieve income transfer objectives (Jayne, Tembo, and Nijhoff 2005). Likewise, after initial steps toward liberalization, Pakistan once again banned the movement of wheat across provinces, and the public sector competed aggressively with the private sector to procure wheat in 2004.
7. Papers from the workshop, held in Washington, D.C., from February 28 to March 1, 2005, are listed in appendix 1 and are available at http://www.passlivelihoods.org.uk/default.asp?project_id=240&nc=4921.

CHAPTER 2

8. Low-income countries are defined as having a GNP per capita of US$765 or less; lower-middle-income counties as US$766–3,305; and upper-middle-income countries as US$3,036–9,385 (World Bank 2004). All low-income countries with a population of more than 10 million were included, except those with serious internal conflicts that would distort production and trade trends. Morocco, Egypt, Indonesia, and South Africa were the lower-middle-income countries, and Mexico and Chile the upper-middle-income countries, included in the sample.
9. These data capture formal trade, although of course there is often considerable cross-border informal trade.
10. Results for an alternative measure, the percentage of total export revenues spent on imports of the food staple, are reported in appendix 1.
11. Erratic policies have also probably encouraged variability in maize production in these countries (see chapter 5).
12. Concentration of consumption is measured with the Herfindahl-Hirschman Index (see notes to table 2.2).
13. In Zambia these households enjoy income levels and asset holdings that are three to four times greater than those of the next group of households, which sells the remaining half of all maize.

CHAPTER 3

14. These results can be attributed to the fact that the standard deviation of fluctuations around trend is declining at about the same pace as the mean, or even faster than the mean in the case of rice (see table 3.1).
15. These statistics reflect the variability of prices in the 1970s. For the period 1981–2003, the respective CVs for rice, wheat, and yellow maize are 25, 22, and 19 percent.
16. These price series are based on FAO data and reflect national average prices. In some cases, they may be official producer prices, although in practice many producers receive prices that are significantly higher or lower than official prices. For example, Pakistan does not collect farm harvest price data, although informal observation suggests that farm harvest prices in some years depart sharply from the minimum support price.
17. White maize prices are likely to be at least slightly more variable than yellow maize prices.

CHAPTER 4

18. For example, Myers (1988); Braverman and others (1990); Islam and Thomas (1994); and Finkelshtain and Chalfant (1997).
19. In economies with incomplete markets, and where food production represents a major share of GDP, food price instability can cause savings to be held in less liquid form, thereby reducing the funds available for capital investment. Second, uncertainty about future price levels can increase the value of waiting to invest, which in turn leads to a reduction in the rate of investment. Third, in the presence of food price instability, producers and investors may have a difficult time separating "permanent" from "temporary" shifts in investment returns, and this difficulty may lead to an inefficient allocation of investment funds.

CHAPTER 5

20. See Bates (1981); Mosley, Harrigan, and Toye (1991); Bates and Krueger (1993); and Van de Walle (2001).
21. See Government of Zambia (1995); Rubey (1995); Jayne and others (1999); and Balat and Porto (2005). Liberalization also benefited urban consumers in Tanzania, but for somewhat different reasons. Here, the volume of subsidized grain distributed through the state marketing system was insufficient

to meet demand. As subsidies became increasingly irrelevant to most consumers, who lacked access to the rationed grain, they increasingly depended on parallel markets, even before markets were officially liberalized (Bryceson 1993). Liberalization reduced food prices by removing some of the policy-related barriers on private trade.

22. See van de Walle (2001); Jayne and others (2002); McPherson (2002); Bird, Booth, and Pratt (2003); and Avalos-Sartorio (2005).

23. Summarized from Avalos-Sartorio (2005).

CHAPTER 6

24. In some of the least-developed countries, the lack of foreign exchange remains a potentially critical national constraint on using food imports to meet shortfalls from a severe natural disaster.

25. For importing and exporting countries, standard measures of border parity can be used. However, for countries that are approximately self-sufficient, market equilibrium prices may fluctuate within a wide band between import and export parity, and more complex supply-demand analysis is needed to compute equilibrium prices [see Byerlee and Morris (1993); Mullen and others (2004)].

26. However, the next year, the government undermined this reform by aggressively intervening in markets and restricting grain movement (box 8.1).

27. A notable exception is Mali, where price information following the 2004–5 drought has been used extensively to guide cereal import decisions by the government and private sector. See Statz (2005).

28. Market information systems for countries within a region also must be linked through efficient means of communication so that information available in one country is immediately available in all countries of the region.

CHAPTER 7

29. For a full discussion of variable levies and tariffs within WTO rules, see Foster and Valdes (2005).

30. Even seasonal price movements can become more extreme when reserves operate. Mozambique, with no food reserve and no restrictions on maize trade, shows a typical seasonal price rise for maize at retail of about 50 percent in its deficit southern region. Malawi, on the other hand, frequently holds a large reserve and intervenes in other ways in the market, but shows the highest seasonal price movement, averaging 90 percent over the last decade [Tschirley and others (2004)].

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