



INSTITUTE FOR AGRICULTURE AND TRADE POLICY

Strategic Grain Reserves In an Era of Volatility

By Sophia Murphy

Institute for Agriculture and Trade Policy

October 2009

Strategic Grain Reserves In an Era of Volatility

By Sophia Murphy
Institute for Agriculture and Trade Policy

Published October 2009 ' 2009 IATP. All rights reserved.

The Institute for Agriculture and Trade Policy works locally and globally at the intersection of policy and practice to ensure fair and sustainable food, farm and trade systems.

Visit www.iatp.org for more information.

Overview

Probably the least well-researched issue relates to the sorts of reserve systems and trade practices that could best minimize undesirable volatility while still promoting sustainable economic growth. This theme was very widely researched after the first food crisis (Headey and Fan, forthcoming), but so far these terribly important questions have scarcely been touched after last year's crisis. (Navigating the Perfect Storm, IFPRI, 2009)

Public debate about food and agriculture has been marked by a powerful resurgence of energy and resources in the last few years. The debate is everywhere—in countries rich and poor alike, in the media (mainstream and not), and in conversation in people's kitchens and vegetable gardens. It is a debate that has, symbolically and substantively, reached the White House. The debates touch on every possible facet of the sector, including the alarming rise in the number of people suffering from chronic hunger over the past several years, the explosion of interest in foreign acquisitions of arable land in some of the world's poorest countries, the dramatic increase in childhood obesity rates around the world, and the potentially devastating implications of climate change for agricultural productivity. The number of people talking about food and agriculture has risen exponentially, and the discussion is anything but complacent.

This paper is interested in one specific element of that debate: the notion of food reserves. Of late, the idea of food reserves has resurfaced in the mainstream food security dialogue. At the most recent G-8 summit, held in L'Aquila, Italy in July 2009, the gathered Heads of State signed a declaration stating:

The feasibility, effectiveness and administrative modalities of a system of stockholding in dealing with humanitarian food emergencies or as a means to limit price volatility need to be further explored. We call upon the relevant International Institutions to provide us with evidence allowing us to make responsible strategic choices on this specific issue.

The question is: What evidence will the relevant International Institutions review? The idea of a grain reserve is as old as civilization. Land cannot be moved, harvests are unpredictable, and consumption is neither elastic nor optional. Stockpiling in times of plenty to guard against famine if the harvest fails is an obvious solution, millennia old; the Bible tells the story of Joseph, a slave, and his interpretation of the Pharaoh's dream that so impresses the ruler that he makes the slave his steward and gives him the power to oversee the storage of one-fifth of the harvest for each of seven years of

plenty in anticipation of seven years of drought. The Bible has it that those without a direct line to God did less well during the famine.

More prosaically, economists have observed that unregulated agricultural markets tend to produce a pattern of long years of declining prices interrupted by short, sharp upward spikes. Those price spikes cause a lot of distress to the consumers who then go hungry (and at worst die of hunger-related diseases), and only help the farmers who have a crop to sell when prices are high. Over time, the price spikes harm farmers by encouraging excessive investment in production, which in turn aggravates long periods of depressed prices.

Yet in the past 20 years, governments all around the world sometimes pushed and sometimes of their own volition have either abandoned or dramatically curtailed reserve programs. Why?

There are (at least) four obvious reasons. First, building a resilient and effective grain reserve is not easy. There is a real risk the efficiency lost in attempting to manage a reserve outweighs the potential benefits of avoiding price spikes and starvation when supplies run short. No one, of course, wants famine deaths. But experience shows that poor food policies, including a poorly run reserve, can exacerbate hunger.

Second, there was a profound and significant shift in economic thinking that dates from the early 1980s and was characterized by the administrations of Ronald Reagan in the United States and Margaret Thatcher in the United Kingdom. Both leaders were great admirers of Milton Friedman, an economist whose thinking stood in clear contrast to that of John Maynard Keynes, the economist whose ideas dominated the first decades after World War II. Friedman led a movement known as the Chicago school of economics (Friedman taught at the University of Chicago), which strongly believes it is necessary to keep government intervention in markets to an absolute minimum. Friedman believed the private sector was inherently better than the public sector, and that where the government was needed to provide certain services, it should always be in competition with the private sector rather than granted monopoly rights. Much of the last 30 years of public policy around the globe have been marked by Friedman's economic thinking, which maintains that it is better for the poor to take their chance with an open market than to rely on civil servants or government officials to get things right. A public grain reserve falls squarely in the territory of bad ideas—for those who hold these economic views.

Third, reserves can be used to meet more than one policy objective, leading to policy confusion. Stocks can help to stabilize prices. They can provide a food security reserve

when commercial supplies fall short. They can help to develop local or regional markets where the private sector is under-capitalized or otherwise not sufficiently engaged. They can compensate for shortfalls in foreign currency reserves, which may not be sufficient to guarantee the needed food imports if domestic harvests fail. Too often, trying to use one instrument to serve multiple purposes leads to failure. Policy confusion also muddies the subsequent post mortem. Did the reserve fail because it is a bad idea? Did it fail because it was not adequately supported? (Grain reserves are often inadequately funded, for example.). Was the program captured by a particular set of economic and political interests, which is a constant hazard for government programs? Human nature and the profit-seeking behavior of private firms further complicate the government's task.

Fourth, reserves operate in a social, political, geographical and economic context. Patterns of land distribution, dietary choices, the condition of the country's transportation and storage infrastructure, and its connections to neighboring countries and world markets are all directly relevant to whether a reserve system can work well. Sometimes the most efficient policy from a purely economic standpoint is too complicated to administer and/or too difficult politically, so a less optimal policy takes its place.

Given the difficulties, what has changed? For one thing, there is an important new sense of pragmatism in policy circles, which have had to confront the limitations of relying on a widely deregulated private sector to manage the economy. The financial crisis that started in 2008 has cost trillions of dollars in public money, reversed what appeared to be the inexorable expansion of global trade and continues to disrupt economic growth. The food crisis highlighted the inadequacies of relying on the market as the only policy tool to address the increasing prevalence of hunger, as well as the need for new technologies and new production systems to redress and reverse the ecological damage associated with industrial agriculture.

This paper provides a brief and partial summary of the idea of building a strategic grain reserve and its history, looks at some of the basic mechanisms involved, and raises some questions for public officials charged with exploring the idea, and for the wider audience of policy advocates concerned about food security.

2. Food Reserves: Purpose, Hazards and Experience

The Purpose of a Food Reserve

Food reserves are an ancient idea, responding to characteristics of agriculture that seem to be timeless, and in particular, to the presence of relatively constant, inelastic demand coupled with a much more variable short-term supply. Policy makers have historically looked to reserves with several objectives in mind.

1. TO CORRECT THE BASIC MARKET FAILURE OF AGGREGATE FOOD MARKETS. Food prices do not self-correct when prices are low. Consumers can substitute one kind of food for another, but they cannot go without food altogether. Nor can they double their calorie intake when prices fall by half (although they might try!). Producers ought to cut production in the face of low prices, to reduce supply and bring prices back up. But no single producer has enough supply to affect the prevailing price, so the rational response is to actually increase production, hoping to sell more (even at lower prices) and to make up in volume what might be lost in value. There are longer-term trends, of course, that do shift supply (and demand) responses. Nonetheless, because food is not optional and supply is uncertain, and because consumers can only get markets to work for them if they have a voice (i.e., purchasing power), markets alone are not best placed to ensure that everyone has access to at least a minimum of safe, nutritious and culturally appropriate food.

2. TO SMOOTH OUT VOLATILE PRICES. This objective has two dimensions: time and space. Policymakers may be interested in smoothing out the price fluctuations that arise because cereal supply tends to come all at once (in a harvest) and only once or twice a year, while demand is steady and unchanging over the year. They are also interested, often, in smoothing out price differences over a geographical territory to ensure that remote or less fertile areas are not penalized by having to pay a lot more for food than consumers that are closer to major food distribution points.

3. TO COMPLEMENT OR REPLACE THE PRIVATE SECTOR. There are several other kinds of market failure or distortion that can be lessened by the use of a publicly managed reserve. For example, the private sector might be under-capitalized or, in some regions, more or less non-existent. There might be an active private sector, but one operating on a monopoly or oligopoly basis, requiring some public sector intervention to protect against predatory pricing. There might be a well-developed processing capacity, or strong market demand,

but inadequate capital invested in production. A reserve can create a kind of guaranteed market to help overcome some of these problems.

4. TO PREPARE FOR FOOD EMERGENCIES. Food emergencies arise for a number of different reasons. They might be caused by a natural disaster (a drought or a flood, for example). They are too often the result of war. They might arise on a regular basis for a variety of reasons, such as under-investment in agriculture and/or depressed local prices, perhaps caused by dumped imports (imports sold at less than cost of production prices). A number of countries have annual production that fluctuates too much to ensure a sufficient domestic food supply every year without stockholding. An emergency reserve can be national, regional or global, and each level has advantages and disadvantages from a public policy perspective.

These are strong arguments in favor of some kind of public policy intervention. Are grain reserves the best solution to these challenges? In considering the reserve as a food security tool, the advantages include:

- Supply in any given location is erratic from year to year; demand is not.
- Price fluctuations are more pronounced and more erratic than supply fluctuations (because supply and demand are inelastic in the short to medium-term, so prices tend to exaggerate changes in either supply or demand).
- The wider the price fluctuations, the more tempting it becomes to create speculative stocks (hoarding), which hurts poor consumers and distorts market signals.
- The world market is thin and volatile, undermining public confidence in it as a safety net. Perfectly open trade might improve this situation by increasing the size of the normal supply but there are powerful political barriers to realizing such an outcome, as well as real market distortions in the form of oligopolistic grain traders and processors.

Some public policy officials, and many academics, argue that a cash reserve that allows a government to buy food when it needs it from world markets is more efficient than holding physical stocks (which are expensive to purchase and store, and which are perishable). For developing countries, two cautions counter such straightforward efficiency arguments: first, the food they want may not be available on the world market; and, second, if the food (or a suitable substitute) is available, they may not be able to afford it, especially if the food shortages are widespread. A physical reserve offers an

important strategy to meet an unexpected spike in demand without the risk of not having enough foreign currency to make a purchase on the world market.

A reserve offers two kinds of protection. It can provide a short-term bridge should supplies run short, while the government has a chance to consider some longer-term options (if needed). And it can play a longer-term role in stabilizing prices just by its existence (reassuring markets that supply is sufficient and thereby calming possible speculation). Moreover, reserves can be a relatively flexible instrument. They can avoid the pitfalls of output quotas or multi-year procurement contracts, which risk locking in patterns of production that waste resources, stifle innovation and tend to divide producers into those who are in by virtue of what they grow, how large their farm is, or where they farm and those who are out.

These are all important advantages. What, then, are some of the risks?

The Hazards

Observers have noted that the countries that most need reserves are those least able to afford the running costs and necessary oversight. These same countries also face the greatest problem with chronic hunger, which complicates the public perception and likely use of a grain reserve. A grain reserve cannot solve chronic hunger, although it can be used to improve market function and in that sense reduce poverty and vulnerability to hunger. The vast majority of the estimated 963 million people living with hunger lack purchasing power not a food supply. A reserve cannot become the alternative food source for people too poor to buy in the market (unless the government has extraordinary means). But it is not easy for governments to explain why they are stocking a grain reserve in the face of existing hunger, even though such a reserve might in fact be making an important contribution to the overall functioning of the food system and thereby making an important contribution to reducing hunger and vulnerability to hunger in the longer-term. A grain reserve in a context where there is chronic food insecurity is best complemented by other policies, including possibly some forms of food aid (such as the U.S. food stamp program, or consumer subsidies of other kinds).

If the reserve can smooth out price volatility, it supports long-term food security by helping both poor producers and consumers to better predict their likely income and expenditures. Clearly, though, the most vulnerable countries are not well placed to do this on their own: a regional system, and outside financial support, and/or some kind of global system is also needed because of the recurrent costs involved (both financial and administrative).

Grain reserves have other disadvantages from a public policy perspective:

1. **RESERVES COST MONEY.** They are a recurrent expense on the national budget (whether as a national reserve or as a contribution to a regional or global program). Reserves can be more efficient or less efficient, and there are ways to recoup some of the costs (for example through judicious use of world markets to buy and sell). But they all cost money. Stocks must be rotated because food is perishable.

2. **RESERVES DISTORT MARKETS.** This is partly their point: they are designed as an intervention to compensate for what markets cannot (or too seldom) achieve. But it also invites a series of headaches for the administrators, as market distortions have their own costs. These are usually in lost efficiency, but also in the potential for mismanagement and outright corruption (see point 4 below). A reserve intended to smooth out price volatility directly undermines the major market driver: open markets depend on price differentials (in time and across geographical distances) to work. The private sector needs to make a profit, and price differentials are the key to making this possible. The effect on market function can be dramatic (choking off private sector activity) or positive (because although some potential profit is lost in the price smoothing policies, other market failures may be corrected, leaving a net positive outcome for private sector activity). In practice, a reserve aimed at maintaining stable prices will usually work with some kind of price band in mind (meaning with an upper and a lower level of target prices) rather than a fixed price (which would be almost impossible to maintain in practice).

3. **RESERVES INVOLVE GUESSWORK.** The beauty of the market is that it sets prices without meetings, econometric modeling, political compromises, or an eye on next year's election results. Here and now, with all the imperfections that might be present, the market tells you what effective supply and demand are. And, with the use of instruments such as futures contracts, the market can also tell you a few months ahead where prices are headed. But governments managing a reserve—especially with price stability in mind, but also for food security purposes—have to guess what next year's harvest will look like, and where the shortfalls might come from. They have to understand and allow for social and cultural preferences, and work with human reactions to times of economic hardship or unusual good fortune. They have to decide where the stock should be held. If the food is held in the capital and a flood cuts off a remote region, it could be that a national reserve cannot reach the people in need but a stock in a neighboring country might.

4. **RESERVES DEPEND ON TRANSPARENT AND ACCOUNTABLE GOVERNANCE.** A public reserve costs not just money, but time and effort. It needs to be both well designed and well governed. It has to stay ahead of the inevitable vested interests that will see an opportunity to advance their agendas at the expense of the proper functioning of the reserve. Good people, properly trained and paid, need to oversee the reserve, and to coordinate its operations with the rest of the food distribution system. The temptation to abuse the reserve is always present, and corrupt practice is a well-established part of the history of reserves, though by no means the only experience. Managing a public fund requires strong oversight, clear rules, and a well-functioning independent judiciary.

5. **THE COMPETITION IS BETTER FINANCED, BETTER INFORMED AND POLITICALLY POWERFUL.** Where the reserve is interacting with a private sector market, as any reserve making sales or purchases on world markets must, governments face the challenge of proprietary knowledge. Just two companies, Cargill and Archer Daniels Midland (ADM), are estimated to control roughly 75 percent of global cereals trade (the trade that takes place in the world rather than domestic markets). Each firm depends on its knowledge of supply and demand to make a profit; no one considers this information part of the public domain—rather, they go to considerable lengths to keep what they know secret. The resources and experience available to these firms exceeds that of most governments, anywhere, and dwarfs the capacity of the vast majority of developing country governments. The private firms involved in the grain trade are too important to ignore. They play a vital role in many of the public policy interventions around food; for example, they ship and deliver food aid. An effective system of grain reserves needs to protect its public policy space but work with the private sector: not an easy balance to achieve.

Some Experiences

Grain reserves have a long pedigree. China has perhaps the oldest model: it has operated more or less continually since 498 A.D. Henry A. Wallace, father of the ever-normal granary in the United States as Secretary for Agriculture under President F.D. Roosevelt in the 1930s, read an account of China's grain reserve policy that was published as a thesis in 1911:

K(Eng Shou-Ch'ang proposed that all the provinces along the boundary of the empire would establish granaries. When the price of grain was low, they should buy it at the normal price, higher than the market price, in order to protect the farmers. When the price was high, they should sell it at the normal price, lower than the market price, in order to protect the consumers. Such a granary was called "constant normal granary." [] This

system has continued from the time the constantly normal granary was established, in 498, to the present day. Although it was sometimes in practice, and sometimes out of practice, according to the political conditions of different ages, its make has nominally existed in nearly all ages.

In the 1950s, the question of how a world food reserve might contribute to food security received significant time and energy from governments in discussions held under the auspices of both the Food and Agriculture Organization (FAO) and the World Bank. When the UN Commission on Trade and Development (UNCTAD) first met in 1964, commodity issues were high on the inter-governmental agenda, and the question of managing agricultural markets was discussed there as well. These discussions were about the possibilities of a reserve at the international level. For the most part, despite the interesting ideas and proposals, there was little action on implementation. The political obstacles to agreeing on a purpose (out of several contenders) and an implementation strategy proved too great.

Interest in the idea renewed when the food shortages of the early 1970s hit. At the time of the 1974 World Food Conference in Rome, the U.S. government spoke in favor of an international grain reserves system, in the form of a collective of national reserves. President Ford addressed the United Nations in September 1974 saying, 'This system [of international food reserves] will work best if each nation is made responsible for managing the reserves that it will have available.' The idea came to nothing. Although the debates were wide-ranging, the safe political ground proved relatively narrow. In practice, the global action focused on reserves to meet emergency shortages, and countries were encouraged to develop national food stocks as a safeguard against poor harvests.

Most developing country governments took control of food production and pricing as they emerged from colonial control. At the time, most industrialized countries also intervened heavily in agricultural markets, using production and import quotas, tariff walls, managed prices and many other kinds of policy interventions. Many developing countries inherited national marketing boards that controlled their primary commodity exports from their colonial occupiers. Where they did not exist, governments were inclined to create them. In the case of cereals, the boards were often given control of domestic distribution, too. Some of the newly independent governments created price band policies for staple foods, and therefore controlled all imports and exports of those staples to protect the domestic price policy.

Modern grain reserves emerged in this context of heavily managed agriculture. Many of the grain reserves were created in response to food emergencies. For example, the Sahel suffered a widespread and severe drought in the early 1970s and needed to import grain. Yet world prices were at record high levels in global grain markets, notably because of unanticipated and dramatic demand for imports from the then-USSR just a few years after the U.S. had sold much of its surplus stock. This led a number of developing country governments to the conclusion that world markets were not a sufficiently secure source in an emergency. Food security stocks were established in several countries in the Sahel and in sub-Saharan Africa between 1975 and 1980, including Burkina Faso, Kenya, Mali, Mozambique, Niger, Ethiopia, Tanzania and Zimbabwe.

The system of food reserves that operated in most African countries was nationally based. Few of these reserves are judged to have been successes and it is common to hear the experience dismissed as a policy failure. In fact, the problems that the reserves faced were not all alike and some models (and some contexts) worked much better than others. Some governments succumbed to the temptation of using grain reserves as part of their bid to keep grain prices as low as possible for urban consumers, at the expense of remunerative prices for producers. The distortions that resulted from price targets that undermined rural economies and necessary investments in agriculture made it difficult to protect the reserves, which were usually controlled by the same authorities that were responsible for normal marketing. Compounding the problem, the responsible authorities did not have adequate financing to manage the reserves effectively. But not every government fell into the same trap. FAO summarizes the situation throughout the 1980s in various African countries:

Progressively, the quantities held in reserves dwindled, eventually ceasing to exist in most countries. The Malawian grain reserve was a notable exception to this generalisation as were the reserves held as buffer stocks within the normal operational stocks of the parastatal grain agency, e.g., Kenya and Zimbabwe. Thus, for many countries the strategic grain reserve, while continuing to form an integral part of the government's food security programme, tended to exist in theory rather than in practice.

Some of the problems were unintended consequences of supporting a few specific crops. For example, FAO discusses the problem of encouraging white maize rather than other crops in East Africa:

By offering so-called incentive prices to producers for white maize on a pan-territorial basis countries such as Tanzania and Zambia encouraged its production in areas which were better suited to more drought resistant crops. As a result, in years of poor rains, farmers in these areas experienced disastrous reductions in production, often leading into transitory food insecurity. The severity of such calamities would probably have been significantly lower had millet and sorghum production been encouraged in these areas rather than maize.

Kenya's reserve was handicapped by the government's policy of maintaining a fixed price for food staples. This, in fact, exacerbated price volatility for the majority, because it forced a parallel market into existence, where prices reflected the effects of a government that forced one price to apply when supply was highly variable. To maintain a national price, Kenya enforced limits on private sales, especially on the movement of grains. That inhibited the private sector from doing what it does best: moving grain from where it is plentiful to where it is needed because of the potential to make a profit on the deal. The National Cereal Production Board of Kenya ended up with an impossible job because it had no control over the purchase or sale price of the reserve food, nor over how much to hold, or when to export or import. A more flexible national policy on price would have allowed the reserve to work much more effectively and would have cost a lot less public money.

Thomas Pinckney's study of Kenya from the mid-1980s, published by the International Food Policy Research Institute (IFPRI), offers an in-depth look at the country's experience with reserves. He considered the then-existing price band in place in Kenya, he looked at how an optimal (from an economic standpoint) reserve might work, and then focused on how the lessons learned from looking at an optimal solution could be applied to improve the price band. In Pinckney's view, the price band was politically viable and administratively possible, while the more market-oriented optimal model, though more efficient from an economic point of view, was not feasible given Kenya's politics (which strongly resisted imports of basic foodstuffs) and its administrative capacities.

With hindsight, commentators noted that many reserves overestimated how much grain was needed in an emergency, assuming that people facing hunger eat the same way they do when times are normal. In fact, people eat less and often eat different foods—cheaper, even uncultivated foods, for example. If the shortage is felt in the market (say the price of rice goes up) then other foods, such as cassava, are likely to make up some of the shortfall. It is also the case that recipients of food aid typically sell some of the food they are given to buy other things, and therefore eat less themselves and/or

buy cheaper food with the cash. Depending on the local food prices, food aid recipients may prefer cash assistance to food aid, making a reserve that releases grain onto the market more attractive than some kind of direct handout of food. On the other hand, it is harder to target assistance this way and if the object is to prevent the very poor from starvation, or from destitution in the struggle to avoid starvation, then an indirect intervention such as increasing market supply may not be adequate.

Development thinking shifted over the 1980s. Collapsing commodity prices, high levels of inflation and depressingly high levels of corruption left many developing countries with huge debts. Governments were forced to restructure their economies significantly to receive debt financing from multilateral banks. Many were pushed into structural adjustment programs that emphasized the need to cut government spending and to limit government interventions in markets. The lenders and donors insisted on a shift in thinking, away from national development plans aimed at relative self-sufficiency (typified by import-substitution in the manufacturing sectors and reliance on domestic production for food security). The new thinking discouraged strong central control by government and pushed countries towards a greater reliance on export sales, foreign direct investment and private sector control of the economy.

Over the next 20 years, governments dismantled much of the state control over agriculture. Subsidies were slashed or eliminated, grain boards were privatized and broken into smaller parts and price stabilization policies were loosened. Politics dictated that governments continue to keep a wary eye on prices and most continued to do what they could to ensure prices did not go too high. In that context, grain reserves remained of interest. But a grain reserve in the context of government-controlled cereal markets calls for quite different mechanisms than a reserve set up in conjunction with an open market.

Opposition to the idea gained ground. Critics warned that grain reserves were likely to depress prices and reduce returns to farmers, as well as sheltering producers from market signals that were their best indicator of what and how much people wanted to buy. At various times, officials from the World Bank, IMF, and IFPRI; government spokespeople from most developed countries, in particular the United States; and, policy advocates for organizations such as the International Policy Council on Agriculture, Food and Trade (made up of former government officials, academics and agribusiness executives dedicated to liberalizing agricultural trade) and the Hudson Institute have all argued against grain reserves.

For example, in an op-ed published in the Wall Street Journal Asia on what to do about the food price crisis in 2008, Hudson Institute writer Rod Hunter wrote:

Avoid counterproductive policies. Some have suggested, for instance, creating food stocks modeled on the petroleum reserves held by oil-consuming countries. This strategy could backfire. The overhang of government-owned reserves would displace incentives for private parties to hold stocks. (Free the Farmers, June 5, 2008)

Though understated in the debate, private grain traders are clearly troubled by the likelihood of reduced price volatility leading to lower profits: volatility is how traders with good market information and global reach make their money. These companies have lobbied hard, and effectively, to limit (and where possible eliminate) market interventions that seek to control prices or production. The companies claim that stockholding should be their business, not the government's. In fact, grain traders have only a limited interest in holding stocks. As agricultural economist Daryll Ray has written, "Although commercial stocks are somewhat higher when reserve stock programs are not in effect, the private sector, farm and non-farm, has no incentive to hold a 'socially optimal level' of stocks."

The private sector's interest is to move grain, from where it is bought relatively cheaply to where it can be sold for a profit. Sometimes short-term pressures induce private firms to hold onto stocks, to ride out a price low or in the hopes that prices might be higher tomorrow. But in fact the private sector has no interest in holding long-term transparent stocks nor does it have an interest in the government doing so, since to limit price volatility is also to limit potential profits from grain sales. The market captures neither the entirety of the private sector interest (which is why markets can help keep the private sector honest) nor the entirety of the public interest, not least because the public interest extends well beyond the consumer interest.

Today, the persistence of the national interest in maintaining at least a minimal level of food security; the increasing incidence of food emergencies (linked to climate change, water scarcity, wars and natural disasters); the uncertain commitment to global markets exhibited by several key agricultural exporters during the most recent food crisis, including Argentina and India; and, the failure of the private sector to manage stocks in a way that serves the public good have all contributed to a marked renewal of interest in the idea of grain reserves.

The U.S. Experience

Within the United States, the debate over the past 50 years has sounded like an echo of the global negotiations. In particular, the Department of State and the Department for Agriculture (USDA) has argued two sides of the argument (for and against reserves). The traditional constituencies of the USDA include food processors, grain traders and the companies that manufacture agricultural inputs (such as seeds, fertilizers and machinery), all sectors that have a big stake in avoiding production limits. USDA has a long history of promoting production and discouraging supply or price management programs. The State Department, on the other hand, is traditionally concerned with stabilizing potential sources of political unrest in developing countries and to spread U.S. largesse, for motives that include the laudable and the cynical alike. This debate took place in the mid-1970s between Earl Butz, Secretary for Agriculture under President Nixon, and Henry Kissinger, Nixon's Secretary of State.

From 1977 to 1996, the U.S. operated a farmer-owned reserve. The system provided farmers with a three-year contract that granted them a loan and some money towards storage costs in exchange for accepting conditions over when the stored grain could be sold on the open market. Over the 1980s and 1990s, a number of agricultural interests (by no means limited to farmers) pushed hard to end this kind of intervention in the market. Those against grain reserves and land set-aside policies emphasized the potential of export markets and the need for U.S. grain to remain internationally competitive (i.e., to cost less than the competition). The cost to the public purse was also emphasized, and with the U.S. as a strong driver in creating the Agreement on Agriculture under what became the WTO, the U.S. became a party to multilateral rules that looked most unfavorably on such trade distorting behavior. With the passage of the 1996 farm bill, the U.S. virtually eliminated grain reserves.

U.S. food aid had always depended on public reserves. Indeed, the fact of the grain surpluses held in reserve prompted some of the largest, and most controversial, food aid programs; such as the Title I food aid given (or sold on concessional terms) as budgetary support to recipient governments. Today, the U.S. food aid legislation still demands that the majority of the food be sourced in the U.S. but there is a small but important shift to increase the capacity of food aid administrators to purchase food from other sources, particularly from suppliers who are closer to the site of the emergency. The U.S. government also still operates the Emerson Humanitarian Trust, which is a food aid emergency reserve. It is mandated to hold up to four million metric tons of wheat, corn, sorghum and rice. The authorizing legislation allows the trust to hold cash instead of commodities.

Between 1989 and 2009, the share of U.S. production in global markets has remained flat or declined in some commodities, despite the fall in domestic prices. There is no evidence that U.S. land set asides have a discernable effect on the volume of commodities produced by U.S. export competitors or on how much they export. Daryll Ray makes the following points about this history:

- b The farmer owned reserve cost millions; the new farm programs cost billions.
- b The United States, [] has gone from adopting commodity programs because free markets didn't work decades ago to saying commodity programs are the reason free markets don't work today.
- b The consumer support estimate (a calculation of how much more consumers pay for their food because of government programs than they would if there was a free market) ignores the tax-financed investment in research and development that has produced such a quantity of relatively cheap food for the consumer in the first place. Would a free market have delivered the same productivity gains?

3. The Options

If a government does decide, alone or with others, to set up a reserve, it faces a number of considerations. The authorities have to answer certain questions about the reserve's purpose and functioning. Typically, the reserves are designed as a precaution against food emergencies and/or (sometimes) to stabilize prices. The emergency relief objectives tend to have very broad political buy-in (at the multilateral level as well as at the regional and national levels), while the price stability objectives are more contested, though, to judge by the rhetoric at the recent G-8 and G-20 meetings, there is a new willingness to explore the need for such mechanisms. In practice, these objectives are distinct but linked. A successful reserve in part depends on its potential to reduce price volatility, not least to calm prices when a disaster strikes. Moreover, readiness to respond to an emergency is clearly enhanced by a vibrant and prosperous economy; an objective to which a grain reserve designed to reduce volatility can make an important contribution.

The following options consider some of the choices for governments looking at emergency reserves and price stability as their objective. Other uses of reserves are also possible. For example, at the level of a village or small town, a reserve could serve to prime the pump for market-based transactions

(providing a safe market that allows producers to explore more risky, but also more profitable, ventures). Such a reserve could also be set up to release stocks at affordable prices if an emergency arises. Many farmer cooperatives, NGOs and some international agencies, such as the World Food Program, are engaged in programs that use reserves for this purpose. Here we focus instead on possible national, regional and multi-lateral options. These are complementary, not competing, strategies.

Food Emergencies

A policy to cope with a food emergency could take different forms. Governments might create a fund to allow them to make purchases when prices spike. As we have seen, there are risks associated with this because of the limitations of the world market (a thin, often unpredictable market that does not stock many developing countries' staple foods) and the possibility that a poor country's purchasing power will not be adequate, particularly if it is competing with a richer country in need (as the Horn of Africa had to when Russia's grain harvests failed in the early 1970s).

In designing a grain reserve in case of emergency shortfalls, governments have to consider what kind of disaster they are likely to face. In the Sahel and sub-Saharan Africa, food emergencies are typically the result of drought. Floods are common but only in a few areas, and they generally do less long-term damage (though in the short-term they can be horrendous). Droughts cause enormous damage, but they rarely come out of nowhere: they can be anticipated, and they reduce rather than destroy the crop, giving time to look for alternatives to make up the shortfall. FAO estimates that the various signs that a shortfall is likely (higher than normal market prices that rise earlier than usual after the harvest plus increased demand for alternative crops) should give at least six months notice to the government that some action is likely to be required. The lead-time should also allow a reasonable estimate of how much additional food might be needed, providing a basis for decisions in relation to the reserve and allowing planning of officials to better manage costs. Since grain reserves are expensive, avoiding the costs of holding stocks that are never used is worthwhile. Clearly, if the drought is affecting a particularly large region, governments will also have to take that into account, as well as any other factors (such as crop forecasts in the major exporting regions) that would affect price and availability on world markets.

A government might also consider a mix of food reserves and cash. The proposals emerging in relation to the discussions at the UN and among the G-8 and G-20 are looking at

a layered approach to food reserves, with both a grain and a cash component. These proposals are aimed at multilateral coordination that includes national efforts.

Price Stabilization

At its simplest, a grain reserve that seeks to stabilize prices buys a commodity when prices are low so as to reduce the supply on the market, and it sells the commodity when prices are high, to increase supply and push prices back down. It can do this around a target price, or, more usually, around two target prices (a high and a low), allowing the market to move but only in between the target levels.

There are a number of requirements if a reserve aimed at stabilizing prices is to be effective. It needs to be properly financed, because such interventions cost money though not as much as a prolonged glut or serious food shortage could cost to remedy. Nonetheless, there are unrecoverable, recurrent costs involved in managing a reserve. In countries where the reserve has not been adequately funded to buy grain at the agreed intervention price, a parallel (technically illegal) market can emerge where volatility is in fact worse than it would likely have been without the reserve, and where the majority of the poor are forced to transact their business for lack of access to the official reserve. India's grain price policies suffer from the problem of not being implemented in all markets, leaving the majority of the poorest producers out of the government price floor schemes.

Price stabilization reserves have to consider which grains they will include as well. In the United States, farmers moved in and out of the so-called program crops (whose prices were managed by various programs, including the farmer owned reserve) depending on whether they saw the target price as sufficient or not. It is far simpler, and cheaper, to store one kind of grain than to attempt to manage a multi-grain reserve. On the other hand, privileging one food stuff over others, especially for price stabilization (not just as an emergency supply) distorts farmers' choices and possibly over-rides other important considerations, such as ecological sustainability, cultural food preferences and allowing consumers to respond to shifts in relative prices.

Price stabilization is about taking the long view. The management and administration of a grain reserve is better at an arms length from elected officials who, like farmers and like agribusiness, are inherently inclined to focus on the near-term. In effect, the reserve is like an insurance policy: it has to marginally favor the worst odds to be able to withstand disaster; and like any insurance policy, the policyholders will

find it tempting to seek to abuse the system and the holders of the insurance company itself will need to be subject to effective and transparent oversight.

The IFPRI Proposal

One of the most widely circulated food reserve proposals in the multilateral policy world is the proposal from the International Food Policy Research Institute (IFPRI), released in March 2009. IFPRI was founded in the 1970s. It is one of the 15 CGIAR institutions (Consultative Group on International Agricultural Research) and is jointly managed by the World Bank and the FAO. Joachim von Braun (IFPRI's Director-General), Justin Lin (at the World Bank) and Maximo Torero, wrote a note for discussion entitled *Eliminating Drastic Food Price Spikes* – a three pronged approach for reserves. It proposes the international community should create three reserves:

1. A small physical food reserve (for food emergencies).
2. A new international coordinated global food reserve to avoid the costs and inefficiencies of everyone having their own (which creates a lot of grain in storage and further reduces an anyway thin market).
3. A virtual reserve to help prevent market price spikes and to keep prices closer to levels suggested by long-run market fundamentals like supply and demand without putting at risk the coordinated global reserves.

The authors give a series of underlying objectives for the three-tier reserve system:

- i) To prevent damaging price spikes;
- ii) To prevent a loss of confidence in the international grain market (which tends to exaggerate supply shortages and encourage hoarding);
- iii) And thereby to:
 - a) Prevent economic hardship;
 - b) Protect strong incentives for long-term investment in agriculture; and,
 - c) Prevent political instability.

In other words, the reserve would provide protection in case of emergencies, but also play a role in stabilizing prices. The physical reserve would be established by the largest of the grain producing states, and funded by a wider group

of countries (together The Club). It would provide some 300,000 to 500,000 tons of basic grains (about 5 percent of current food aid flows i.e., not much). The grain would be stored in national facilities in or near the biggest population concentrations in the developing world. IFPRI proposes that WFP administer the food, all of which would be earmarked for emergencies. A fund would be established to cover the operating costs of the reserve, such as the cost of replenishing supplies after a crisis has passed. The fund would also cover contingencies such as rising transportation costs.

While the specific features for a new international coordinated effort could be further discussed we propose that there should be an agreement under the auspices of the United Nations that each member country (from The Club) will hold a certain amount of public grain reserve in addition to the pipeline stock that the private sector holds for commercial operations. Although the exact amount of public reserve that each country holds is a subject for study, it will not be too large as a percentage of its domestic grain demand annually. These reserves would be drawn upon by the high-level technical commission only when needed for intervention in the spot market (IFPRI, March 2009).

The virtual reserve is the new element in the proposal. It is intended to counter the risk of speculation, which was widely acknowledged to have (at a minimum) exacerbated the price volatility experienced in global commodity markets between 2007 and 2008, and (at worst) to have been the dominant short-term cause of prices rising as far and as fast as they did. In essence, the proposal is to create a club (The Club) of member countries, each of whom would commit to providing the funds, if required, to intervene on the commodities futures market with a view to pre-empting excessive speculation. In effect, The Club would act to reduce spot prices (the price you pay on the day for delivery of a commodity) by selling short contracts (effectively promising to make a certain amount of commodity available at a future date at a price set on the day the contract is signed). Such sales would ensure supplies continued to be available, curbing the temptation to hoard, or to hold onto stocks to try to drive prices higher than underlying conditions (demand and supply) would warrant. IFPRI estimates that to be credible (i.e., to have enough purchasing power to have an effect in the market), the virtual reserve would need to be worth USD 12–20 billion, which is equivalent to 30–50 percent of normal grain trade on futures markets. IFPRI notes that the exact amount will take more study because the volume of trade is today so huge.

The IFPRI proposals have merit. It is important that international agencies contribute their ideas and experience to this debate. The coordinated reserve, managed by The Club of affected and donor countries, helps to solve the dilemma created by each country trying to protect its own food supply and thereby risking increased volatility in international markets, which already tend to be thin and therefore subject to supply shocks. Food security agencies such as the World Food Programme also note that while individual countries need for food aid varies significantly year to year, regional demand is much more constant, facilitating the operation of a reserve. In a study of Eastern and Southern Africa published by IFPRI in 1986, Koester showed a regional reserve would save 41 percent of the costs over national level efforts.

The proposal to create a virtual reserve has also drawn a good measure of criticism. Most food emergencies are the result of an absolute shortage of food in a given (or a number of) local markets, not the result of movement on the global commodity exchanges. Moreover, the proposal seems to accept that commodity markets are adequately regulated, and that a well-intentioned (and funded) honest broker can provide the market with the guidance it needs to avoid excess. This is strongly contested by many observers, who argue that the systematic dismantling of rules that governed commodity markets is where the problem lies. Starting under the Reagan administration in the later 1980s, and continuing under the Clinton and George H.W. Bush administrations, rules that limited how much money speculators could invest in the commodity exchange were relaxed, allowing speculators to overwhelm real buyers and sellers.

What about trade?

Coming at this discussion in 2009, it is impossible not to reflect on the role that international trade might, or should, play. For several decades, the international policy debate on food security has been overwhelmed by a relatively narrow discourse on global trade, focused at the WTO but also evident in regional negotiations. At the time of the 1996 World Food Summit, many governments seemed to conflate the two concepts almost completely: the strong implication was that the realization of a fully-integrated global agricultural trade system would somehow ensure universal access to adequate and nutritional food for all. This is clearly not true. And today, in 2009, such a strong assertion of the primacy of international trade as a food security tool is also less often heard in the policy debates. Price volatility, the continuing (but perhaps today, more visible) problem of a chronic lack of access to affordable and appropriate food, and the evident triumph of politics over neo-classical economic theory in most (though not all) major agricultural exporting and importing countries trade policies has brought the debate back to earth.

Where does that leave trade? Grain reserves can be entirely separate from the normal market or they can be integrated with the market. Some engage in trade directly, selling surplus (both to bring in some income and to rotate stock) and buying as well, to rebuild stocks. Buying from world markets allows stockholders to take advantage when world prices are low and to avoid purchases of domestic production if domestic supply and demand are closely matched in an average year. The reserve does not want to inﬂate prices such that consumers are hurt, or to signal to producers that more production is needed than the market is normally able to absorb, which would set up a longer-term price fall.

FAO's experience, reinforced by studies such as Pinckney's review of Kenya from 1986, suggests that a variable reserve that adjusts its stockholding year-to-year based on assessments of need can be an effective model. Such a system relies on accurate and timely information. It also does not always work well with budgeting cycles (crop years and ﬁnancial years do not necessarily coincide). It will likely need to err on the side of caution, holding more stock than a strictly optimal rotation might dictate (the point is to be ready for an emergency, not an average year). But FAO argues it makes sense to work with the markets that are available, especially as the government may be able to attract favorable terms as a big buyer (and, in some years, seller). Since the stock needs to be rotated anyway, it also makes sense to allow the agency to convert stocks into cash as the market allows, not least so as to improve the reserves responsiveness when domestic supplies are short. The Food Reserve Agency of Zambia uses this combined cash and grain approach to their reserve.

World markets are not an aggregation of global production rather the opposite. It is estimated to include some 10 percent of global food production, and for many staple foods, the total volume of global trade is even less than that. Roughly 7 percent of the rice grown worldwide crosses a border. White maize, the staple food in East and Southern Africa has historically hardly been traded outside the region, while the same goes for cassava, plantains, yams, millet and sorghum – all of which are staples in West Africa.

Nonetheless, the world market is dynamic. The volumes of food traded internationally are increasing, and potential for trade to offset production failures has thereby improved. International trade in white maize, for example, has also grown since NAFTA came into effect and prompted an increase in production in the United States (to the detriment of local production in Mexico). There is more trade in southern Africa, too, since the end of apartheid and the improvement in political relations within the region. South Africa is a relatively big producer of white maize. Encouraging regional trade in staples that are

hardly traded in world markets is one way to ensure a larger overall supply (by stimulating demand) without incurring the costs of a big storage scheme.

Judicious use of world markets and international trade is not the same as relying on world markets to be the ultimate grain reserve. Advocates of global markets as a food security mechanism argue that such a policy saves the cost of holding and administering stocks, while eliminating waste and the temptation to corruption. Yet there are important factors that offset these apparent advantages. First, few developing countries generate enough foreign exchange from their exports to easily afford imports. Second, the food consumed locally is not always readily available on world markets. Relatively few crops are traded internationally in any signiﬁcant way, particularly the food staples of relatively poor people living in developing countries. Third, global trade agreements have not successfully addressed some of the fundamental market power issues in global commodity markets, particularly the oligopolistic power exercised by a number of commodity traders and processors.

Finally, the WTO has rules that make reserves hard to operate. The WTO considers any domestic program that interferes with prices or production volumes to be trade-distorting. Price ﬂoors, production quotas and import tariffs used to support price stabilization objectives are all either prohibited or disciplined, such that funding to the programs is limited and eventually expected to be eliminated altogether. In reality, the rules are not as clear-cut, or as tight, as their advocates had hoped. They nonetheless, at a minimum, have a chilling effect on the possible policy instruments and have pushed many countries, not least the United States, towards abandoning tools related to public stock holding.

4. Reﬂections and Questions

The renewed attention to agriculture and food security among global policy makers is very welcome. So is the more speciﬁc interest in the question of grain reserves and the possible role they can play. For IATP, the context of a discussion on food reserves is two-fold: fulfillment of the universal human right to food (in a relatively deep and broad understanding of the right); and, correcting the failures and distortions in agricultural markets that undermine the long-term public interest in economically and ecologically sustainable food production and distribution systems.

Realization of the universal human right to food includes meeting the needs of today's people while protecting the ability of future generations to meet their needs from the planet they will inherit. A human rights approach asserts that an adequate food supply is an essential, but not in itself

sufficient, condition for protecting food security. The essential issue is the relationship people have to the food that is available. Nobel economist and philosopher, Amartya Sen (1981), describes four kinds of relationships. He calls them entitlements:

1. Trade-based entitlement (an exchange of something that one owns for something that one wants)
2. Production-based entitlement (one owns what one produces using one's own resources or resources hired following agreed principles)
3. Own-labour based entitlement (one owns what one works for)
4. Inheritance and transfer entitlement (one owns what is willingly given to one by another who legitimately owned it)

It is not enough that food be available. People have to be able to establish some kind of claim to food: they need enough money to buy it, enough land to grow it, and/or the security of family or community relationships that protect and provide for dependents (children, the disabled or the elderly). Entitlements can break down: an estimated 1.2 billion people already live without access to adequate food to support a healthy life. People who live at or below the poverty line can quickly lose access to food when prices rise, even a little. Those living in rural areas without clear legal title to land and water (whether as individuals or as members of a community) are also at risk. Children or people who fall ill in families that have been disrupted by migration or social breakdown quickly become vulnerable to hunger.

Secondly, IATP is persuaded that agriculture and food markets are beset by a series of problems that require public action. These include poor regulation (and enforcement) of competition laws that allow oligopolistic companies to dominate many parts of the food system worldwide. They include national and multilateral trade laws that presume to govern all agriculture as if it were a commercial enterprise when it patently is not. They include market failures, such that renewable but finite natural resources and public goods, including social inclusion, are not adequately valued.

For a government to attempt to intervene in a market is a big decision. It is so difficult to get it right, to not stifle innovation, to create a situation that is dynamic, responsive and yet continues to serve the government's purpose. It is particularly hard not to create vested interests that then spend considerable time and money fighting change, even when change is clearly needed. As U.S. food aid programs show, it is all too easy, especially in the name of the poor or the hungry,

to create multi-million dollar programs that are more about commercial interests than the public good. Some food stock policies have caused enormous damage, particularly those associated with the agricultural policies that dumped surplus production on other countries at prices that made a mockery of the market. Yet without interventions, an unacceptably high price is paid in human lives, stunted by malnutrition and lost to disease.

IATP believes that a system of grain reserves can play a useful role. A first suggested list of desirable criteria for such reserves includes:

- An arms-length and accountable governance structure
- Enough policy flexibility to respond to unusual events and to evolve as circumstances change
- A clear mandate and the requisite authority and means to fulfill that mandate
- Some financial independence, possibly generated by the operation of the fund and/or in the form of an endowment or protected budgetary allocation
- A regional component, to be able to respond more efficiently and effectively to crises
- National and sub-national reserves, especially where poorly functioning markets inhibit the emergence of resilient and reliable food production and distribution mechanisms
- A realistic view of what role world markets can be expected to play

There are many questions that need more consideration. They include:

1. What do the new technologies of globalization offer a system of food reserves? Storage, communications, information technology and shipping: many of these sectors have changed dramatically since the 1980s. Can these changes build more transparency in the system? Reduce costs? Improve systems to keep stock turned over to reduce waste? Linked to these changes, what are the implications of volatile and rising energy prices? Industrial agriculture is heavily dependent on oil as an input as well as for transportation in a globalized economy.

2. Will the historic patterns persist in the face of the significant new challenges confronting agriculture? The past several hundred years of agriculture have seen extraordinary and accelerating change, raising productivity faster than population growth. Is this pattern set to continue? Or will production get tighter as a result of the emerging challenges created by diminishing water supplies, falling productivity increases from green revolution genetics (the generation that preceded the biotech revolution), the loss of genetic diversity in many of the most commonly cultivated plants and domesticated animals, the loss of soil fertility and uncertain rainfall, new diseases, not to mention the interaction of all these trends with the uncertain implications of climate change? Already, the evidence suggests that climate change will reduce yields in some of the world's most vulnerable regions

Beyond these questions remains the issue of how a system of grain reserves should best be managed. There is something of a crisis of leadership in the global governance of food issues. There are the three Rome-based institutions: the FAO, created after the Second World War; the World Food Program, created in 1962 to deal with food emergencies; and, the International Fund for Agriculture and Development, created as an outcome of the 1974 World Food Conference to fund food production in developing countries. Each of these can play a part, but in fact food and agriculture issues today engage UNICEF (children) and UNIFEM (women), WHO (health) and UNEP (environment), ILO (labor) and UNHCHR (human rights), and they continue to engage UNCTAD, not to mention the WTO, on the trade side, as well as the IMF and World Bank as financial institutions. The High Level Task Force on Food Security, established to respond to the food crisis and which meets under UN auspices, involves 20 different UN agencies, programs or departments, as well as the World Bank, IMF and WTO.

Whatever the multilateral solution might be, a large component of protecting food security through reserves will land on national governments. They will need to show leadership in creating institutions that are not beholden to the government of the day, that answers to farmers and consumers but that is not captured by either, and that can protect a measure of innovation and independence to allow the reserve to adapt as circumstances change.

A tall order, no doubt: but not an impossible task. We have several thousand years of history to draw upon.

References

1. FAO, State of Food Insecurity in the World (Rome: FAO, 2008).
2. Bill Vorley, Food Inc: Corporate concentration from farm to consumer (London: UK Food Group, 2003).
3. Huan-chang Chen, The Economic Principles of Confucius and His School, (New York: Gordon Press, 1974) 572. Originally presented as the author's thesis, Columbia, 1911.
4. D. John Shaw, World Food Security: A History Since 1945, (Hampshire: Palgrave Macmillan, 2007), 155.
5. John Lynton-Evans, introduction to Strategic grain reserves: guidelines for their establishment, management and operation, FAO Agricultural Services Bulletin-126. (Rome: FAO, 1997), online at <http://www.fao.org/docrep/w4979e/w4979e00.htm> (accessed September 13, 2009).
6. Ibid.
7. Thomas C. Pinckney, Storage, Trade, and Price Policy Under Production Instability: Maize in Kenya, Research Report No. 71 (Washington, D.C.: IFPRI, 1988).
8. Ibid.
9. John Lynton-Evans, Strategic grain reserves: guidelines for their establishment, management and operation, FAO Agricultural Services Bulletin-126. (Rome: FAO, 1997), online at <http://www.fao.org/docrep/w4979e/w4979e00.htm> (accessed September 13, 2009).
10. Daryll E. Ray, Agricultural Policy for the Twenty-First Century and the Legacy of the Wallaces, Presented at John Pesek Colloquium of Sustainable Agriculture, Iowa State University (Ames, Iowa: March 3, 2004), online at <http://www.epfs.eu/uploads/documents/RayLecture2004.doc>.
11. More background can be found in: Chad Hart and Bruce A. Babcock, Time for a New Farmer-Owned Reserve? Briefing Paper 00-BP 31 (Iowa City: Iowa State University, CARD, 2000) and in an unpublished paper by Schaller, H.D., De la Torre Ugarte, D. & Ray, D.E., Grain Reserves in an Ethanol Era (APAC, University of Tennessee, 2007).
12. Daryll E. Ray, Agricultural Policy for the Twenty-First Century and the Legacy of the Wallaces, Presented at John Pesek Colloquium of Sustainable Agriculture, Iowa State University (Ames, Iowa: March 3, 2004), online at <http://www.epfs.eu/uploads/documents/RayLecture2004.doc>.
13. John Lynton-Evans, Size of Grain Reserve section of Strategic grain reserves: guidelines for their establishment, management and operation, FAO Agricultural Services Bulletin-126. (Rome: FAO, 1997), online at <http://www.fao.org/docrep/w4979e/w4979e00.htm> (accessed September 13, 2009).
14. John Lynton-Evans, Strategic grain reserves: guidelines for their establishment, management and operation, FAO Agricultural Services Bulletin-126. (Rome: FAO, 1997), online at <http://www.fao.org/docrep/w4979e/w4979e00.htm> (accessed September 13, 2009).
15. Joachim von Braun, Justin Lin and Maximo Torero, Eliminating Drastic Food Price Spikes: a three pronged approach for reserves, (Washington D.C.: IFPRI, 2009).
16. Ulrich Koester, Regional Cooperation to Improve Food Security in Southern and Eastern African Countries, Research Report No. 53 (Washington, D.C.: IFPRI, 1986).
17. Bill Vorley, Food Inc: Corporate concentration from farm to consumer (London: UK Food Group, 2003).
18. UNCTAD, African Development in a Comparative Perspective (Geneva: UN, 1998 & 1999) 29.
19. Christopher B. Barrett and Daniel G. Maxwell, Food Aid After Fifty Years: Recasting Its Role (London & New York: Routledge, 2005).

