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The 2007–08 international food price crisis caused hardship on a number of fronts. The steep rise in food prices led to economic difficulties for the poor and generated political turmoil in many countries. The crisis could also result in long-term, irreversible nutritional damage, especially among children. There is a global interest in preventing such events from recurring.

The price crisis was triggered by a complex set of long-term and short-term factors, including policy failures and market overreactions. One important factor in the crisis was the entry of significant financial resources into futures markets, including food commodity markets, which contributed to a price spike during the first six months of 2008. This episode highlights the need to modify the architecture of international financial and agricultural markets to address the problem of price spikes, especially their effects on the livelihoods of the poor.

Although a set of guiding principles for regulating agricultural and commodity futures markets should be developed and recent inappropriate trade policy instruments such as export bans should be reviewed, these actions are not sufficient to avoid extreme price spikes and to ensure that the world can respond to emergency needs for food. We propose two global collective actions to meet these goals. First, a small physical food reserve should be established to facilitate a smooth response to food emergencies. Second, an innovative virtual reserve should be set up to help prevent market price spikes and to keep prices closer to levels suggested by long-run market fundamentals like supply and demand. This brief offers some specifics on

implementing a proposal described in our earlier IFPRI policy brief titled *Physical and Virtual Global Food Reserves to Protect the Poor and Prevent Market Failure* (June 2008).

Price instability is a general feature of agricultural markets. The proposals made here are designed not to stabilize prices generally, but to prevent damaging price spikes. The proposed actions will entail costs, but the modest costs of the required organizational elements must be balanced against the benefits of more effective international financial architecture. These benefits will include prevention of economic hardship, improved market efficiency, stronger incentives for long-term investment in agriculture, and prevention of political instability.

The Role of Speculation in the Price Spike

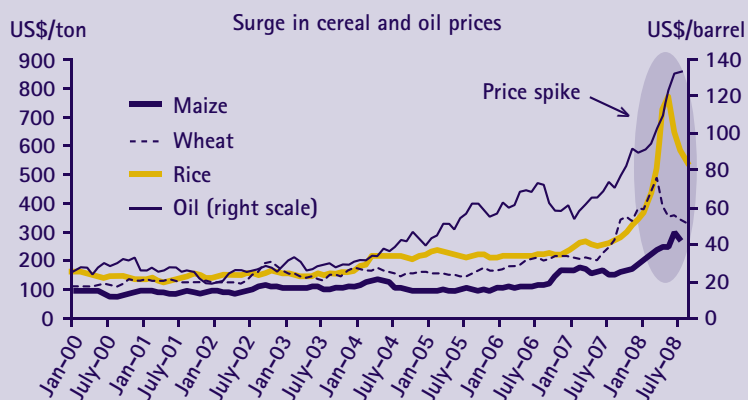
Changes in supply and demand fundamentals cannot fully explain the recent drastic increase in food prices. Rising expectations, hoarding, and hysteria also played a role in the increasing level and volatility of food prices, as did the flow of speculative capital from financial investors into agricultural commodity markets. As a result, a price spike greater than what is explainable by fundamentals occurred during the first six months of 2008 (Figure 1).

The flow of speculative capital from financial investors into agricultural commodity markets was significant. From May 2007 to May 2008, the volume of globally traded grain futures and options increased substantially (Table 1). Another indicator of speculative activity—the ratio of the monthly volume of futures trading to open interest—also increased substantially.

Open interest describes the total number of futures contracts of a given commodity that have not yet been offset by an opposite futures contract or fulfilled by delivery of the commodity. A speculator taking opposite positions in the market within days or weeks will generate an increase in monthly registered volumes but little change in monthly open interest. Therefore, changes in this ratio should capture changes in speculative activity. In 2008, soybean and rice ratios of futures to open interest were increasing at 27 percent and 19 percent, respectively, as wheat ratios continued to grow at 19 percent and maize ratios declined slightly. In contrast, in 2005 and 2006 at least three commodities' ratios were declining on average.

Several statistical tests were conducted to determine the role of speculative activity in pushing up commodity prices. The results suggest that speculation might have been influential (see box on page 2 entitled "On Speculation" and the IFPRI issue brief *When Speculation Matters*,

Figure 1—Surge in grain and oil prices



Source: FAO (Food and Agriculture Organization of the United Nations), International commodity prices database, <http://www.fao.org/es/esc/prices/PricesServlet.jsp?lang=en>, accessed 2008.

Table 1—Growth in the volume of globally traded grain futures and options, May 2007–May 2008

Commodity	Growth in traded volume (%)	
	Futures	Options
Maize	0	13
Soybeans	40	69
Soybean oil	46	69
Wheat	17	45
Rough rice	48	41

Source: Chicago Board of Trade 2008.

by Miguel Robles, Maximo Torero, and Joachim von Braun. Washington, DC: International Food Policy Research Institute, 2009). Appropriate global institutional arrangements for preventing this kind of market failure are needed.

The Proposed New Institutional Design

To cope with the market failures revealed by the food price crisis, there are two traditional options. The first is to build up a significant physical, public, globally managed grain reserve. In a globalized world, however, the scale of reserves required under this option would make storage costs excessive. A physical reserve is thus not appropriate as a major global initiative, but only as a minor one to address the need for smooth emergency operations. One way to minimize storage costs could be an internationally coordinated arrangement for shared reserves stored at the country level, as proposed by World Bank chief economist Justin Lin. Such an institutional design could be appropriate for the small physical emergency reserve proposed here.

The second option is to change the regulation of commodity exchanges to limit the volume of speculation versus hedging, to make delivery on contracts or portions of contracts compulsory, and to impose capital deposit requirements when each futures transaction is made. Difficulties could arise, however, in walking a line between ineffective regulations and overzealous ones. Market regulation also raises political economy concerns: regulatory measures could benefit relatively small groups, certain groups may capture control of the regulatory agency, regulatory agreements may not be completed, and countries may lack the institutional capacity to implement and enforce the regulatory measures. Although some improvement in regulation is called for, regulating commodity exchanges in harmony across the globe appears too complex a collective action problem given very different country circumstances.

The two global collective actions we propose—a small, independent physical emergency reserve and a virtual reserve and intervention mechanism backed up by a financial fund—would avoid these problems while ensuring that the world can respond to emergency needs for food and prevent extreme price spikes.

The independent emergency reserve. A modest emergency reserve of around 300,000–500,000 metric tons of basic grains—about 5 percent of the current food aid flows of 6.7

million wheat-equivalent metric tons—would be supplied by the main grain-producing countries and funded by a group of countries participating in the scheme. These countries would include the Group of Eight Plus Five (G8+5) countries (Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, the United States, Brazil, China, India, Mexico, and South Africa) and perhaps others. This decentralized reserve would be located at strategic points near or in major developing-country regions, using existing national storage facilities. The reserve, to be used exclusively for emergency response and humanitarian assistance, would be managed by the World Food Programme (WFP). The WFP would have access to the grain at pre-crisis market prices to reduce the need for short-term ad hoc fundraising. To cover the cost of restoring the reserve to its initial level (that is, the difference between the post-crisis price and the pre-crisis price times the quantity of reserves used by WFP), an emergency fund should be created and its level maintained by the participating countries. The fund should be accompanied by a financing facility that the WFP could draw upon as needed to cope with potentially increased transport costs, as experienced in the 2008 crisis. This arrangement could also be defined under a newly designed Food Aid Convention.

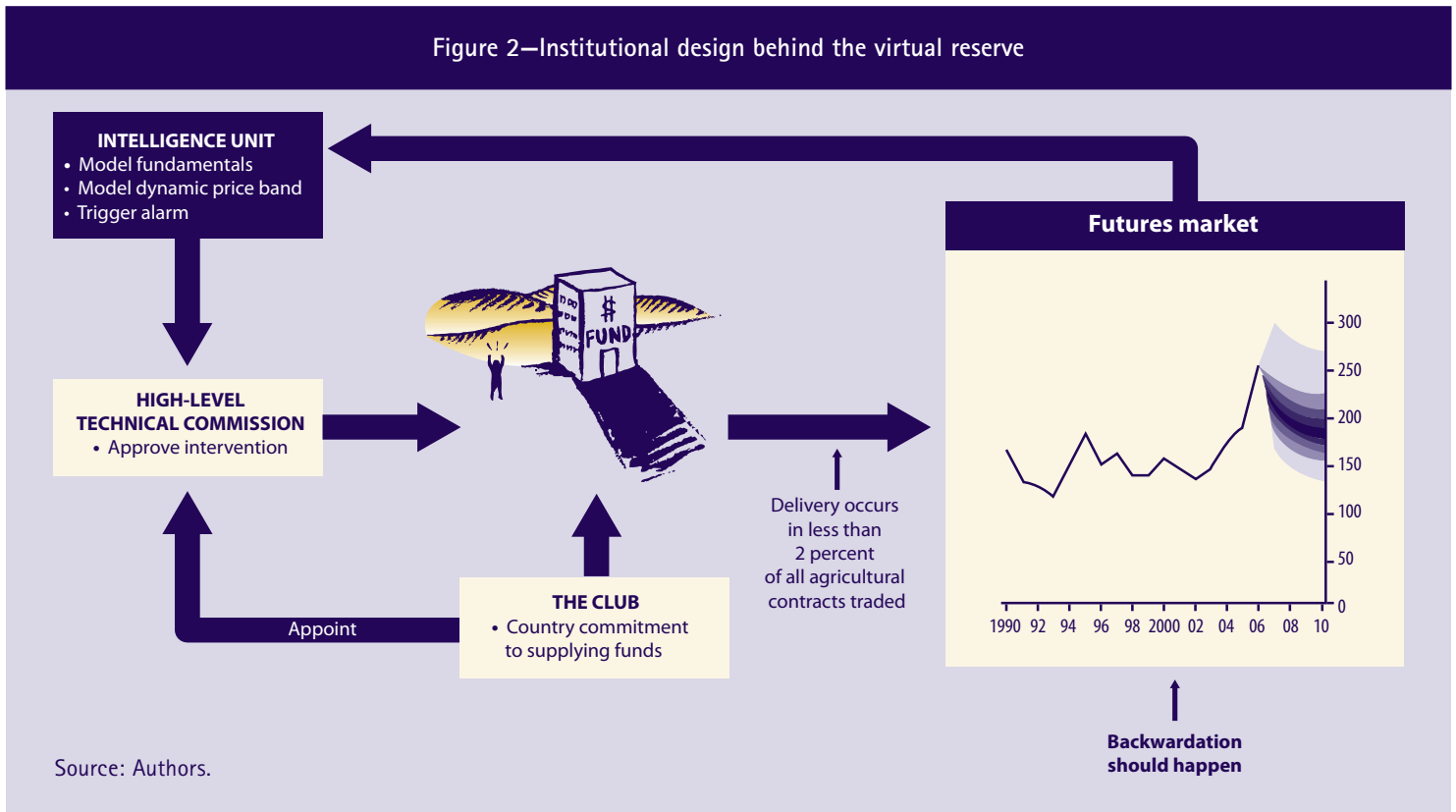
The virtual reserve. The virtual reserve and intervention mechanism would have four major components (see Figure 2).

1. *The Club.* The virtual reserve would be implemented as a coordinated commitment by the member countries of the Club, which may consist, for instance, of the G8+5 plus some other major grain-exporting countries (such as Argentina, Thailand, and Vietnam). Each country would commit to supplying funds, if needed, for intervention in the futures market. Agreement on the arrangements for the Club will not be easy and may require a high-level United Nations task force to analyze the way forward. Yet similar institutional

On Speculation

Our analysis tested to what extent a series of indicators for speculative activity can help forecast spot price movements. The Granger causality test—which determines whether past movements in one variable can help explain current movements in another one—was applied to each agricultural commodity. The results show that the ratio of monthly volume to open interest and the ratio of noncommercial long positions to total long positions in futures contracts has an influence in forecasting price movements for wheat and rice. When the same ratio for short positions was analyzed, there was additional evidence that speculation affects prices, with significant results in maize and soybean markets. There is evidence, therefore, that speculative activity partly explains the price spike since January 2008 (see the IFPRI issue brief *When Speculation Matters*, www.ifpri.org/pubs/ib/ib57.asp).

Figure 2—Institutional design behind the virtual reserve



arrangements have been made in the past; examples are the International Fund for Agricultural Development (IFAD) and the Food Aid Convention (FAC). IFAD was established as an international financial institution in 1977 as a major outcome of the 1974 World Food Conference in response to the food crises of the early 1970s. The FAC, first signed in 1967 and renewed five times, is the only treaty under which signatories have a legal obligation to provide international development assistance.

2. *The fund.* The fund would normally consist not of actual budget expenditures, but of promissory, or virtual, financing by the Club. The fund would be drawn upon by the high-level technical commission only when needed for intervention in the futures market (much previous evidence has shown a link between futures and spot markets—see citations at <http://www.ifpri.org/pubs/bp/bp010reading.pdf>). Preliminary estimates show that for the virtual reserve to be a credible signal, the fund should be US\$12–20 billion. A fund of this size might cover 30 to 50 percent of normal grain trade volume. Determining the exact size of this fund will require further analysis, however, because commodity futures markets allow for high levels of leverage.

3. *The global intelligence unit.* The global intelligence unit, to be established by the Club on a permanent basis, would have three main roles:

- *Forecasting prices in the medium and long run.* The unit will forecast prices by combining an assessment of the fundamentals component (supply and demand factors) with a medium-term to long-term financial model in which the spot price of a commodity at a certain time

is decomposed into stochastic factors. The unit would pay special attention to key indicators of how well commodity exchanges are functioning, such as divergences between spot prices and futures prices. Using models that capture fundamental forces in price determination as well as stochastic factors, the unit will incorporate the impacts of market intervention policies.

- *Designing and maintaining a dynamic price band system.* The unit would design a fairly widely defined price band based on the forecasting model.
- *Triggering interventions.* The unit would trigger the alarm to the high-level technical commission that prices are significantly outside their estimated price band (that is, prices are approaching a spike) based on the dynamic price band system. The high-level technical commission would then decide whether to approve sales in the futures markets until a speculative attack is largely eliminated. The recommendation of the intelligence unit would include the price at which sales of futures should be made and the duration and frequency of the operations.

The intelligence unit would be part of an existing multilateral institution with a small team of full-time staff. Ideally, the intelligence unit could be built within an institution that already has the long- and medium-term modeling infrastructure for price forecasting. It would also draw on existing analytical capacity in specialized organizations (such as FAO, the U.S. Department of Agriculture, IFPRI, and the World Grain Council).

- 4. *The high-level technical commission.* The high-level technical commission, which would be appointed by the Club on a

permanent basis, would make the official decision to intervene in the futures market once the triggers are activated by the intelligence unit. This commission will need to have full autonomy.

How the Intervention Mechanism Will Operate

The intervention mechanism will be two-pronged. First, and perhaps most important, the global intelligence unit will announce price forecasts and specify the price band. This announcement will be a signal—or a threat—to speculators that intervention is likely if futures prices exceed the defined upper limit of the price band. Moreover, the announcement will specify a confidence interval for the upper limit to increase the risk for potential speculators.

Second, if, despite the signal, there is evidence of an emerging price spike, the global intelligence unit will alert the high-level technical commission that prices are significantly above their estimated dynamic price band based on market fundamentals. The autonomous technical commission will then decide whether to intervene in the futures market. This intervention would consist of executing a number of progressive short sales (that is, selling a firm promise—a futures contract—to deliver the commodity at a later date at the specified price) over a specific period of time in futures markets at market prices at a variety of different future positions until futures prices and spot prices decline to levels within the estimated price bands. The global intelligence unit would recommend the price or series of prices to be offered in the short sales.

This increase in the supply of short sales will reduce spot prices and should make speculators move out of the market—in other words, a backwardation will be created (the situation in which, and the amount by which, the price of a commodity for future delivery is *lower* than the spot price or a far future delivery price is *lower* than a nearer future delivery price). Moving speculators out of the market will minimize the potential second-round effects of this intervention given that spot prices will return to being consistent with fundamentals, and therefore the lower spot prices should not result in the accelerated use of available supplies.

All futures contracts are ultimately settled either through liquidation by offsetting purchases or sales (the vast majority of agricultural futures contracts are settled this way) or through delivery of the actual physical commodity. The virtual fund will thus come into play only if there is a need to realize the futures sales, in which case the fund will be used to obtain the necessary grain supply to comply and calm the markets. Usually, this action

would not be necessary and the whole operation would stay virtual. Questions will remain about the price, the amount of short sales, and the duration of the intervention in the futures markets, and answering them will require political consultation and continuous monitoring and research. If the system governing the virtual reserve is established by large grain-exporting countries, there would be no temptation to aim for particularly low food prices that would undermine producers' incentives.

The innovative concept behind the virtual reserve is the signal that it gives to markets, including speculators. Its presence alone is likely to divert speculators from entering this market. Nonetheless, the commission must be ready to trade grain when necessary and to assume the costs if in the future it must buy back contracts at a higher price than it sold them for.

The global intelligence unit has an important and challenging role in price forecasting. To be a credible basis for market intervention, price forecasts must contain some new knowledge, widely regarded as credible when released, that is not already reflected in the structure of market prices. This new knowledge consists of the combination of the fundamentals component (that is, supply and demand factors) and a medium- to long-term financial model that captures stochastic factors.

The physical and virtual reserve system should be continuously monitored and evaluated for effectiveness. A comprehensive cost-benefit assessment of the system must go beyond agricultural markets to include food security and poverty considerations.

Final Considerations

The major goal of the proposed virtual reserve is to establish a mechanism that will, through market transactions, minimize any speculative attack on food commodity markets to avoid price spikes in the future. It would not interfere with market fundamentals, but rather enhance long-term efficient supply response and investment in agriculture. A virtual reserve system would also help prevent the kinds of harmful ad hoc trade policy interventions, such as export bans, high export tariffs, and high import subsidies, that have been both a cause and an effect of the recent price crisis.

Neither the poor nor governments can afford excessive speculation in food markets. There is clearly a need for global collective action to facilitate well-functioning grain markets. The virtual reserve concept is a viable innovative option that could prevent speculators from unduly affecting this basic food market, which is so central for the livelihoods of the poorest 2 billion people.

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