

## World Food Price Bubble and China's Food Security

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### Introduction

The price of nearly every agricultural commodity sharply increased in 2008, creating a global food price bubble. At their peaks in the second quarter of 2008, world prices of wheat and maize were three times higher than at the beginning of 2003, and the price of rice was five times higher (Figure 1-3). The surge in food prices has become a major political concern because of its role for inflation, its impacts on the whole economy, and because of adverse effects on the wage earning poor and middle class. The price developments can help reduce urban – rural income gaps in the aggregate, but some groups in rural areas lose and others gain. The issue is not only one of too fast increases in prices, but one of risky volatility and of inappropriate policy responses around the world posing threats for free trade and possibly for political stability in some countries. In China, Consumer Price Index (CPI) kept increasing in 2008. CPI increased 8.5% in April 2008, a monthly record in 12 years. The increases from food, vegetable, livestock prices are the main reasons behind the CPI increase.

In the past few months, the prices of major cereals have fallen by about 20-50 percent on the world market as a result of the economic slowdown and favorable weather conditions, but they remain high compared with three years ago. Most experts agree that the food price would remain high relative to historical trend<sup>1</sup>. The world food price bubble has revealed the weakness of agricultural sector as well as the serious deficiencies in the information available for guiding policy responses. While the current price relief is welcome, we need to understand the deeper causes of this food price bubble and learn some lessons from the food crisis. We then may be able to design sound policies to ensure that the poor have sustainable access to adequate amounts of nutritious food. We think a dual strategy is needed: (1) a science and technology initiative at a national and global scale to address the long-run problem, and (2) a comprehensive social protection and food and nutrition initiative to address the short and medium-run problems. China, which has expanded its investment in agriculture by 23 percent in 2007<sup>2</sup>, can play an important role in this needed strategy, both domestically, and at a global scale.

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<sup>1</sup> See for example, von Braun, J. 2009. Food and Financial Crises: implications for agricultural and the poor. IFPRI Food Policy Report. Washington, D.C

<sup>2</sup> National Development and Reform Commission, 5th session of 11th National People's Congress, March 5, 2008, Beijing

## The new causes of food price inflation

Strong and new forces of change in the world food equation are transforming food consumption, production, and markets.<sup>3</sup> On the demand side it is high income growth, change of peoples' consumption preferences with urbanization, and subsidized biofuel production; on the supply side it is too slow-growing productivity, low stocks, weather induced supply shocks, and climate change; these forces add up to global agriculture imbalances and have led to drastic agricultural price increases. The rise in cereal prices has indeed been dramatic. Since the beginning of 2000, the price of wheat increased more than three-fold, while the prices of corn and rice more than doubled. When adjusted for US\$ depreciation, the price increases are lower, but still drastic. The global surge in food prices has been translated at the national level. In China, year-on-year inflation in January 2008 rose by 7.1 percent, reaching a record high in 11 years. Food price inflation now contributes to about 85 percent of overall inflation, compared to less than 50 percent in 2005-2006. The high global agricultural prices do not appear likely to fall soon. IFPRI's global scenario analysis<sup>3</sup> suggests that real world prices for cereals and meat will continue to be high. While current peaks may not remain for the long run, rice, wheat, and maize prices will increase by about 20 percent by 2015 beyond 2006 price levels, and beef, pork, and poultry prices are projected to grow by up to 10 percent in the next decade.

### Demand

The global system of agriculture today is very much driven by the demand side. With income growth, globalization, and urbanization, demand for agricultural products will continue to grow and shift towards high-value commodities. IFPRI's projections until 2015 show that global cereal demand will increase across all regions up to 20 percent. By 2050, demand will increase by more than one-third in East Asia and the Pacific and three-fold in Sub-Saharan Africa. In China, most of the demand for cereals will be driven by animal feed demand, which will double by 2050. On a per capita basis, cereal consumption for rice and maize in China will decline by 18 and 35 percent by 2050. These trends will be accompanied by very strong growth in meat consumption, especially in poultry and beef. Poultry consumption per capita will increase almost three-fold by 2050, and beef consumption – more than two-fold, and milk consumption also increases fast.

### Energy and Biofuels

Biofuel production has contributed to the changing world food equation and currently adversely affects the poor through price-level and price-volatility effects. Ethanol and biodiesel production, which largely draws on maize and oilseeds, has a strong effect on agricultural prices. IFPRI's global scenario analysis until 2020 projects that biofuel expansion may result in price increases of 26 percent for maize and 18 percent for oilseeds compared to 2005. As new linkages and trade-offs are created between the agricultural and energy sectors, agricultural commodity prices are becoming increasingly correlated to energy prices. The worrisome implication is that volatile energy prices will translate into larger food price fluctuations. Second-generation biofuel

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<sup>3</sup> For details see: von Braun, J. 2007. The World Food Situation – New Driving Forces and Required Actions, IFPRI Food Policy Report. Washington, D.C.

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technologies, which may lessen the food-fuel competition and the negative effects on the poor, are still a long way away. Waiting for the emergence of second-generation technologies, and planning for “leapfrogging” to these technologies later, makes sense for many countries. In view of concerns about food security, China has adopted modest biofuel expansion plans, compared to others. Basing future fuel ethanol production on non-food feedstocks and waste and relying on non-arable lands could be a suitable strategy for other countries as well.

## Growing Water Scarcity

Demand for the world's increasingly scarce water supply is rising rapidly, challenging its availability for food production. Agriculture is competing with industrial, household, and environmental uses, and water will be increasingly transferred from irrigation to other uses in relatively dry regions. Even as demand for water by all users grows, groundwater is being depleted, other water ecosystems are becoming polluted and degraded, and developing new sources of water is getting more costly. Three broad strategies that can address the challenge posed by water scarcity for food production include: i) investments in infrastructure to increase the supply of water for irrigation, domestic, and industrial purposes; ii) water conservation and improvements in the efficiency of water use in existing systems through water management and policy reform; and iii) improvements in crop productivity per unit of water and land through integrated water management and agricultural research and policy efforts, including crop breeding and water management for rainfed agriculture. Improvements in the irrigation sector must be made at the technical, managerial, and institutional levels.

China is a country with substantial water resources, but due to continued population growth it needs to be shared by an increasing number of persons. The average availability of renewable water resources (surface water and groundwater) in China has declined from 2,849 m<sup>3</sup> per person per year in 1980 to 2,180 m<sup>3</sup> in 2003, and is rapidly approaching the internationally accepted thresholds for defining water stress (1,700 m<sup>3</sup> per person per year) and water scarcity (1,000 m<sup>3</sup> per person per year). Due to large differences in precipitation between regions, the distribution of water resources is highly unequal (see Table 1). Current water availability in the North (757 m<sup>3</sup> per person) is almost 25 percent below the water scarcity threshold, while water availability in the South (3,208 m<sup>3</sup> per person) is relatively abundant. Large differences also exist within the northern region, with the so-called 3-H river basins - the Hai & Luan, Huai and Huang (= Yellow) river basins - facing the most severe water scarcity; per capita water availability in the 3-H basins was estimated at 499 m<sup>3</sup> in 1999<sup>4</sup>.

**Table 1: Water availability per capita, 1980 – 2003 (cubic meters)**

	<b>1980</b>	<b>1993</b>	<b>2003</b>
Total	2,849	2,373	2,180
North	964	838	757
South	4,176	3,665	3,208

Source: Shalizi (2006)

<sup>4</sup> World Bank (2001), *China: Air, land and water*, Washington, D.C.: World Bank.

Due to the growing scarcity of surface water, groundwater use in agriculture is rapidly increasing. The number of tubewells used for groundwater irrigation has increased from 0.2 million in 1963 to 4.7 million in 2003<sup>5</sup>. Nearly all these tubewells (95 percent) are in northern China, even though only 30 percent of the groundwater resources are located in the northern part of the country<sup>6</sup>. Using results from a regionally representative village survey held in six provinces in northern China, Wang et al. (2007) examined the impact of groundwater extraction on the water table level. They found that the water table had increased between 1995 and 2004 in 16 percent of the 448 villages that were surveyed. In 35 percent of the villages the groundwater level showed little or no decline since the mid-1990s, while in 48 percent of the villages the water table had declined. In 8 percent of the villages, the rate of decline exceeded 1.5 meters per year, implying 'serious overdraft' (following the definition of the MWR). Official statistics for the North China Plain (MWR, various years) show that during the period 2000-2006 the groundwater level on average declined in 61 percent of the monitoring sites while the level increased in the remaining 39 percent. The total groundwater volume increased in two out of seven years (2003 and 2005; years in which precipitation was relatively high), while it declined in the other five years.

Evidence presented in World Bank et al. (2001) for the 3-H basins in northern China shows that groundwater depletion is most severe in the Hai basin. Between 1958 and 1998, shallow groundwater levels have declined between 10 and 50 meters in a vast area surrounding Beijing, Shijiazhuang and Tangshan. In all four subareas of the Hai Basin, the use of groundwater exceeded the amount of exploitable fresh groundwater in 1997; in the Huai and Huang basins this was the case for two of the 15 subareas (World Bank et al. 2001: Figure 3.11 and Table 3.9). Groundwater depletion also takes place in areas where authorities do not supply safe water due to growing water pollution, such as the lower reaches of the Yangtze. It is estimated that 25 billion cubic meters of non-rechargeable deep-aquifer groundwater were mined in China in 2000, mainly for agricultural purposes (World Bank and SEPA, 2007).

The water available for use in agriculture has been reduced by the higher water demand for industrial and consumption usage, which increased by 23.8 percent over the period 1997-2006. By using more efficient irrigation systems and cultivation methods, total water use in agriculture declined by 12.4 percent from 392.0 to 343.3 billion m<sup>3</sup> between 1997 and 2003 despite an increase in the irrigation area by 5.4 percent during this period (World Bank, 2006). After 2003, however, water use in agriculture increased by 6.7 percent - thereby exceeding the increase in irrigation area during the same period - to 366.4 billion m<sup>3</sup> in 2006 (National Bureau of Statistics, 2003-2007). As a share of total water use, the use of water in agriculture has steadily declined from around 80 percent in 1980 to 63.2 percent in 2006.

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<sup>5</sup> Zhang, J. (2007), "Barriers to Water Markets in the Heihe River Basin in Northwest China," *Agricultural Water Management* 87, pp 32-40.

<sup>6</sup> Wang, J., J. Huang and S. Rozelle (2005), "Evolution of Tubewell Ownership and Production in the North China Plain," *Australian Journal of Agricultural and Resource Economics*, Vol. 49, no. 2: pp 177-196.

### Climate Change

Although there are considerable uncertainties regarding the impact of climate change on agriculture, there is a growing consensus that agricultural production globally is likely to be reduced by climate change, with developing countries experiencing the greatest production losses and increased food insecurity. Aggressive policies for climate change mitigation and adaptation can reduce the negative impacts. While there are viable mitigation strategies for the agricultural sector in the developing world, key constraints need to be overcome: first, a new and more comprehensive post-Kyoto international climate change regime must be negotiated; second, the rules of access to carbon trading—which still do not credit developing countries for reducing emissions by avoiding deforestation or improving soil carbon sequestration—must change, and, third, the operational rules, with their high transaction costs for developing countries and small farmers and foresters in particular, must be streamlined.

Some of the carbon sequestration may further compete with food production and may increase the shortage of supply and add to the high prices. Nevertheless, the most aggressive mitigation efforts that can be reasonably anticipated cannot be expected to make a significant difference in the short to medium term. This prospect means that climate change adaptation has become an imperative. Many adaptation strategies are extensions of good development policy, including a) promoting growth and diversification; b) investing in research and development, education and health; c) creating markets in water and environmental services; d) improving the international trade system; e) enhancing resilience to disasters and improving disaster management; and f) promoting risk-sharing, including social safety nets and weather insurance. But effective adaptation strategies must also go beyond good development policy to explicitly target the impacts of climate change, particularly on the poor.

### Supply constraints

In view of the high agricultural demand, rising prices, and emerging challenges, the global production response has been slow. The overall productivity growth in agriculture is simply too low to cope with the fast demand. Total factor productivity—that is, the aggregate productivity, not just yields per unit of land or animals—grows by about 1.3 percent per annum in most regions and by about 2 percent in China. Its growth is dependent on technological progress. Between 2000 and 2006, cereal supply increased by mere 8 percent. The production response to high prices is impaired because of land and water constraints and because of neglect in agriculture innovation investments in many countries in past years. Yields grow very slowly in most regions today that have already reached high levels of production in the past. Africa shows actually the highest agricultural growth compared to other world regions, but starting from low levels. Increased production driven by higher yields (and not by area expansion) and increased productivity in the livestock sector require substantial investments in research and development (R&D), services, and input supply systems. The need for more agricultural science and technology investment is further increasing due to climate change, continuing population growth, and must embrace the entire value chain with enhanced food quality and safety. Yet, growth in global public agricultural R&D expenditures, especially in developed countries, has slowed down. Developing countries as a whole are currently undertaking more of the world's public agricultural R&D, largely due to China,

Brazil, and India. Many developing countries, however, are still underinvesting in agricultural R&D and are dependent on science and technology spillovers, while the international network of agricultural research centers, the CGIAR, remains underfunded.

### Structural problems

Small farmers dominate world agriculture and these farmers would like to take advantage of the new income-generating opportunities presented by high-value products, but for many, barriers to market entry remains high. These barriers arise from geographic distance to national market centers, lack of market organizations and information as well as the increased safety and quality standards of food processors and retailers. The regional and intercontinental integration of the agrifood system has been accompanied by a rise in the power and leverage of international corporations. Between 2004 and 2006, the sales of the top 10 food retailers soared by more than 40 percent, while the sales of the top food processors and agricultural input companies grew by 13 and 10 percent, respectively. The disparity of scale between small farmers and the rest of the agrifood business chain is also increasing due to still further fragmentation of agricultural holdings in many countries<sup>7</sup>. Institutional innovation with new forms of contracts and cooperation to overcome the problem of fragmentation and scale in the small farm sector is needed.

### Needed Policy Actions

World agriculture is facing new and historically different challenges, and is not well prepared for that. The persistence of poverty in the rural areas of low- and middle-income countries, of high food prices undermining livelihoods, and of deficiencies in the sustainability of agriculture requires large-scale global action. A coordinated global response is needed with new partnerships among old and new players such as the United States, Europe, China, India, Brazil, United Nation agencies, foundations, the private sector and the global research system, that is, the Consultative Group on International Agricultural Research (CGIAR).

Four actions are recommended, and China can play important roles in all four of these:

1. **Developed countries should facilitate flexible responses** to drastic price changes by eliminating trade barriers. A world confronted with more scarcity of food needs to open up trade more—not less—to spread opportunities and risks fairly. Subsidies for biofuel production and excessive quotas for blending petrol with biofuels should be stopped. Programs that set aside agriculture resources, except in well-defined conservation areas should be terminated.
2. **Developing countries should rapidly increase investment in rural infrastructure and market institutions** in order to reduce agricultural-input constraints, since these are hindering a stronger production response. Also, these countries need to remain open to

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<sup>7</sup> Gulati, A. and S. Fan. 2007, eds. *The Dragon and the Elephant: Agricultural Reforms in China and India*. Baltimore: The Johns Hopkins University Press for the International Food Policy Research Institute.

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trade. The recently by many countries introduced export bans and import subsidies should be ended. Government interventions and scaled up investments should be supported by good governance practices<sup>8</sup>.

3. **Investment in agricultural science and technology would play a key role** in facilitating a stronger global production response to the rise in prices. A global R&D initiative for accelerated agriculture productivity makes economic sense, is pro-poor and sustainable, and serves security.
4. The **acute risks** facing the poor due to reduced food availability, high prices and limited access to income-generating opportunities **require expanded social-protection measures now**. Depending on circumstance, such social protection could include food aid in kind and cash transfer programs, employment programs, and social security and health systems strengthening, targeting the poorest with a focus on enhancing early childhood nutrition programs.

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<sup>8</sup> Fan, S, L. Zhang, and X. Zhang. 2002. Growth, Inequality, and Poverty in Rural China: The Role of Public Investment. IFPRI Research Report 125. Washington, D.C.: International Food Policy Research Institute.

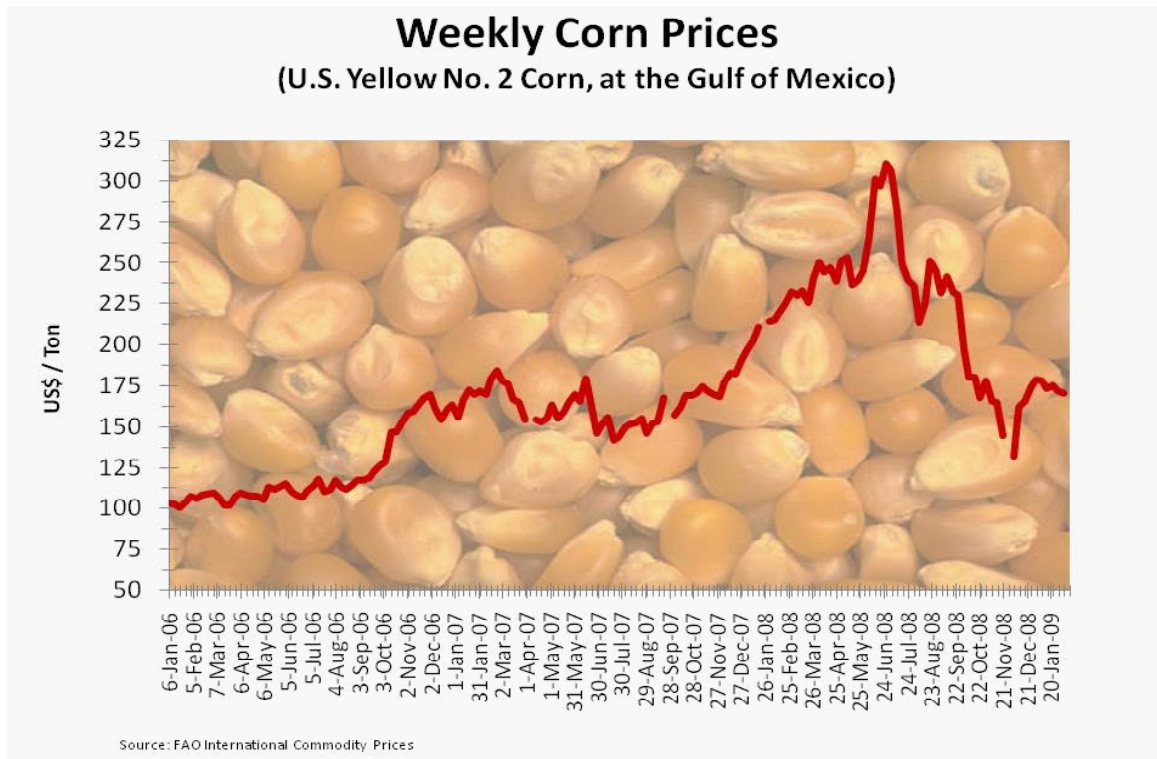
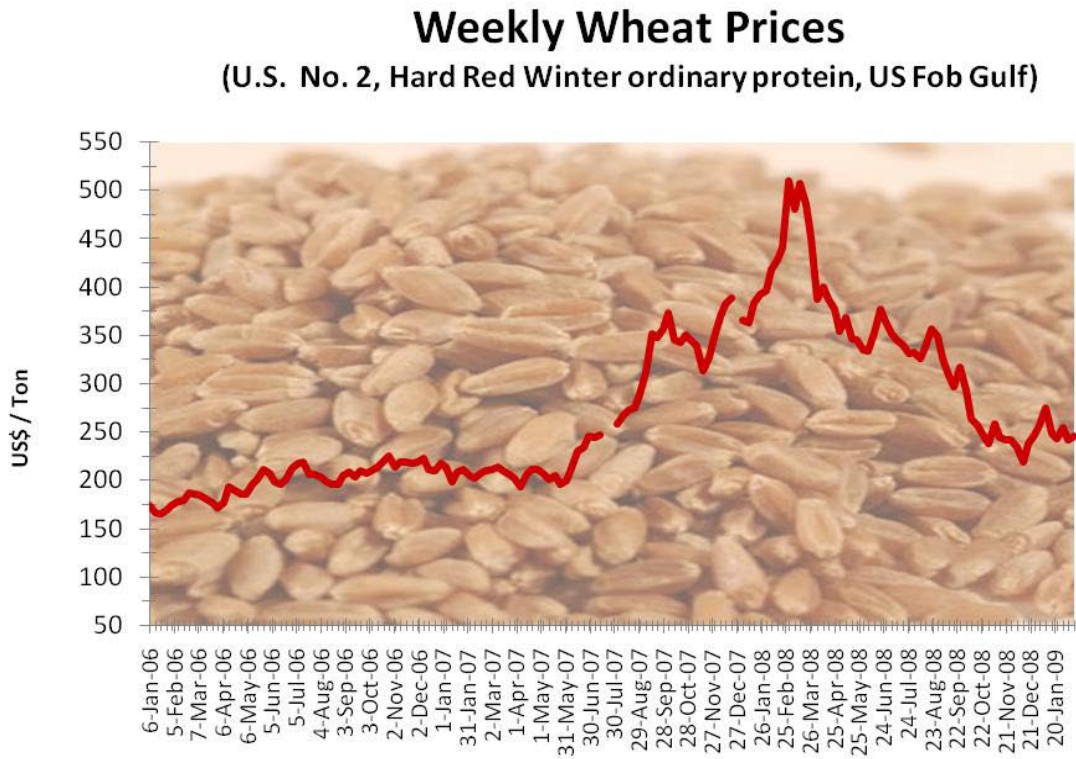


Figure 1 Weekly Corn prices



Figure 2 Weekly Rice prices





Source: FAO International Commodity Prices

Figure 3 Weekly wheat pricey