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**Contribution from the World Bank to the
G20 Commodity Markets Sub Working Group**

**Facilitating Short and Longer-term Supply
Response to Higher and More Volatile
Food Prices**

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CONTRIBUTION TO G20 COMMODITY MARKETS SUB WORKING GROUP¹

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World Food Prices Are Higher and More Volatile

International food prices spiked for the second time in four years in early 2011, igniting concerns about a repeat of the 2008 food price crisis and its consequences for the poor. In June 2008, the World Bank Food Price Index² increased almost threefold compared to January 2000. In February 2011, it reached its 2008 peak after a sharp decline in 2009 and stayed at about that level until June 2011.

International food price uncertainty has also increased along with average levels. Although price volatility is an intrinsic characteristic of agricultural markets, it has increased markedly over the last five years, compared to the previous two and a half decades, even when controlling for inflation³. More adverse weather conditions in the main producing regions, rising land and water constraints, and stronger linkages with more volatile oil prices, including through biofuels, tend to place upward pressure on food price volatility. These factors are likely to persist in the short-to medium-term suggesting that volatility may be higher in the future than that observed in the 1980s, 1990s, and early 2000s⁴.

Episodes of high prices and extreme volatility create uncertainty that is a major threat to food security in developing countries⁵. Farmers deciding what to plant, and countries deciding when to import, face significant uncertainty with respect to the distribution of future food prices. While producers who are net sellers have welcomed recent periods of high prices, uncertainty as to post-harvest prices is a disincentive to a strong supply response, especially in poorer developing countries. In fact, most of the supply response to high 2008 prices came from developed and emerging market economies⁶. International food price uncertainty also leads to fundamental food security risks for consumers and governments in poor countries. For poor consumers, high food prices can mean reducing consumption, leading to episodes of

¹ This note is prepared by World Bank staff Robert Townsend, Aparajita Goyal, and Christopher Delgado (ARD).

² The World Bank Food Price Index includes: wheat, maize, rice, barley, sugar, coconut oil, soybean oil, groundnut oil, palm oil, copra, soybeans, soybean meal, orange, banana, beef, and chicken.

³ See World Bank (2012 Forthcoming) Responding to Higher and More Volatile World Food Prices, and FAO (2011) *Safeguarding Food Security in Volatile Global Markets*, Adam Prakash (editor).

⁴ World Bank (2011): *Global Economic Prospects: Maintaining Progress and Turmoil*. Volume 3, June 2011, Washington, D.C.

⁵ According to 1996 definition used in FAO's flagship annual *State of Food Insecurity in the World* (Rome: FAO), "food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" ((2011).

⁶ "Price Volatility in Food and Agricultural Markets: Policy Responses," June 2011, Paper prepared for the G20 by international organizations,

http://www.worldbank.org/foodcrisis/pdf/Interagency_Report_to_the_G20_on_Food_Price_Volatility.pdf

irremediable malnourishment of children of pre-school age; shifts to less nutritious diets by adult workers will lower their productivity.

Consequences of Higher and More Volatile Food Prices

Sudden, large, and most particularly unexpected food price increases make it difficult for households to adjust, eroding consumers' purchasing power, reducing calorie intake and nutrition, and pushing more people into poverty and hunger. The poor bear a disproportionate burden of adjustment to rising food prices; they typically spend more than half their incomes on food and are the ones most likely to be forced to curtail consumption in the face of higher prices.

Higher food price volatility also lowers production response to higher crop prices in developing countries. While price changes that stem from known and expected processes, such as seasonality, are largely already factored into production and marketing strategies in both developed and developing countries, uncertainty about major and unusual prices changes--as experienced since late 2007--induces risk-adverse behavior that leads to inefficient investment decisions. Wealthier farmers in developed and emerging market economies find it easier to mitigate known price risks through insurance and futures markets, but even known risks are harder to manage for poorer farmers in developing countries, where high basis risk and high transactions costs limit their options in this regard. In both developed and developing countries, price uncertainty (unknown but clearly present risks) is harder to manage. At best, wealthier agents in developed countries may hesitate to make major new investments to increase production. At worst, poor smallholders in low-income countries may retreat into food self-sufficiency strategies on a highly variable and low productivity resource base, which will often vitiate their best options for improving and securing their livelihoods.

Put differently, higher prices are of greatest benefit to farmers if they are relatively certain about them so as to better inform production decisions, if they have access to inputs at a cost that is low enough to expand production profitably, and they have the resources and knowledge to expand production beyond subsistence needs. This was not the case for many of the world's smallholders in 2008⁷. Rising food prices are estimated to have benefited some smallholder farmers in developing countries, particularly in rice monoculture systems of Asia. Yet worldwide, the majority of smallholders are net buyers of grain or barely self-sufficient and overall losers have outnumbered winners among the rural as well as the urban poor, with a net increase in the number of poor⁸.

The impact of unexpected spikes in world food prices on the supply response also varies according to the extent to which these prices are transmitted locally. The transmission of world food prices to local prices varies greatly across countries and crops, and over time. Some large Asian countries managed to limit or largely eliminate the transmission of the 2007/08 rice price spike to the domestic rice prices in 2008 through policy means. However this ended up

⁷ Ivanic, M. and W. Martin (2008): Implications of Higher Global Food Prices for Poverty in Low- Income Countries. *Agricultural Economics* 39: pp. 405-416.

⁸ Wodon, Q., C. Tsimpo, P. Backiny-Yetna, G. Joseph, F. Adoho and H. Coumbe (2008): Potential Impact of Higher Food Prices on Poverty. World Bank Policy Research Working Paper No. 4745, Washington, D.C.

changing the price of rice relative to other commodities within countries, and proved expensive to sustain over time. It also removed large shares of the world population from the pool of producers and consumers, whose consumption and production responses to prices are necessary to restore global price equilibrium. Grain exporters that impose export bans to stabilize domestic prices further reduce the pool of people who will participate in adjustment of production and consumption to prices. The same is true of major importers that maintain tariff protection against grain imports that they lower only when world prices are high, as happened in 2010.

The result of isolating policies such as those seen since 2008 is that the poor in poor countries experience the largest price increases and it is on them that the burden of reducing consumption and increasing production in response to high prices falls most. In Africa, for example, about half its rice consumption and 85 percent of its wheat consumption is imported and domestic wheat and rice prices in Africa tend to be heavily influenced more by world prices. Domestic maize prices on the other hand are less influenced, particularly off major transport routes. Isolation tends to keep domestic markets separate from international ones. However it also makes such markets very vulnerable to domestic weather shocks, and governments are now less certain that they have been over the past three decades that they can rely on imports if they have to.

Determinants of Increases in Food Prices and Volatility: Cherchez le Supply-Side

Increases in global demand for food are driven by population and income growth, and by an accelerated use of food crops for industrial purposes, such as biofuels, but there are no "demand shocks" creating uncertainty. The world population has more than doubled over the last 50 years from 3 billion to 7 billion. Food consumption growth (all uses, including feed and industrial) over this period increased 1.4 times population growth (2.4 percent per year food consumption growth compared to 1.6 percent population growth), driven by additional demand for grain as animal feeds, and in industrial products such as biofuels. While demand for cereals for all uses has sped up slightly in recent years due to non-food uses, there is no case for believing in demand shocks for food, or that there is uncertainty in the rising demand for food. On the contrary, demand growth is as sure a bet as there can be in commodity markets, and occurs at a fairly regular pace. Supply is a different matter, and myriad changes here interact with price uncertainty to channel and dampen supply response to higher prices.

Binding land and water constraints, rising inputs costs, and lags in development of improved cereal varieties have made productivity gains harder to achieve. Higher total factor productivity growth will be needed to meet rising global demand to keep food prices affordable.⁹ World yield growth rates have halved from 3.4 percent in the 1970s to 1.7 percent today (based on a 7-year growth rate period). The rate of growth of yields was even less for several years in the mid 2000s, falling below the level of population growth, when the effects of the long-run declines in world real grain prices on agricultural research budgets were at their worst. Water constraints limit the future expansion of irrigated agriculture. Crude oil prices underpin production costs of agricultural products relying on fertilizers and fuel (particularly

⁹ From 1961 to 2007, the global agricultural total factor productivity is estimated to have grown by 0.99 percent annually, increasing from 0.77 percent during 1960-89 to 1.45 percent during 1990-07, see Fuglie, K. (2010): Total Factor Productivity in the Global Agricultural Economy: Evidence from FAO Data.

important in both developed and emerging market economies¹⁰), and transport costs (particularly important in many developing countries¹¹). Crude oil prices rose sharply along with fertilizer prices from 2002 increasing farm production costs (e.g. agriculture is more than four times more energy intensive than manufacturing) intensifying the need for more efficient use of energy intensive inputs.

Adverse weather has also always been with us, but has played a particularly significant role in the most recent price spikes, foreshadowing a worsening future. In 2010, weather was a strong factor in reducing global cereal production and stocks. Simultaneous production losses in Canada, Russia, Ukraine, and EU-27 fed into world price expectations. Following subsequent production declines, cereal stocks of the traditional developed country exporters fell by 27 percent in 2010/11. More generally, the number of reported droughts, floods and extreme temperatures seems to be increasing in 2010 alone, a record number of 19 nations set temperature records. Overall, weather variability, possibly due to climate change, is having a significant impact on international food prices. Besides climate change, almost all growth in export volumes of grain since 1990 have occurred outside the traditional grain exporting areas of North America, Western Europe and Australasia, from areas such as the Black Sea region and the Southern Cone of Latin America, which are historically subject to more variable weather than is the case for traditional exporters.

Facilitating Short and Long-term Supply Response to Higher and More Volatile Food Prices

Short-term supply response

Less restrictive grain trade policies help spread the burden of adjustment to supply and demand imbalances as widely as possible, and help avoid concentrating the burden of adjustment on a smaller group of poor countries and people whose main option for price adjustment is for the malnourished poor to eat less. On the supply side, more open trade is vital to encouraging rapid supply response. While export bans (or *ad hoc* tariff reductions in importing countries) can reduce prices for consumers, they also reduce prices for producers, thereby reducing the incentive for supply response. Collective action to reinforce rules-based trade on such sensitive products is not easy, but is nevertheless essential to dealing better in the short-term with the new realities of volatile food prices associated with more variable local supplies. Building trust in the transparency of world food markets through better, more accurate, and timely knowledge of world availability can also reduce the risk of insulating trade policy responses¹².

¹⁰ In US agriculture, the share of the energy-intensive inputs (fertilizers, chemicals and fuel) in total farm production costs increased from 22 to 35 percent for corn and from 19 to 28 percent for wheat between 1996-00 and 2006-09 (www.ers.usda.gov).

¹¹ In most countries of Sub-Saharan Africa, a 1 percent increase in fuel costs increases transport costs by 0.5 percent, resulting in large increases in farm input costs and declines in farm output prices, see World Bank (2009): *Transport Prices and Costs in Africa: A Review of the Main Trade Corridors*. Washington, D.C..

¹² <http://www.amis-outlook.org/>

Long-term supply response

More and better long-term public investment is essential to dealing with food price volatility over time. Higher prices help induce more private investment in food production, but in poor countries a long-term sustained public commitment (from donors and governments) to induce private supply response, including from smallholders, is also needed. Only this can prevent future food crises, albeit as a necessary, if not a sufficient, condition¹³.

Investments should focus on low- and middle-income countries that have a conducive policy environment. (i) *Low-income countries*: Less conflict, macroeconomic stability, lower agricultural taxation, and improved rule of law, particularly in Africa, increase the return to investments in food crop productivity growth. Public investments have increased, and yields are improving, but more is needed. FAO projects significant increase in demand for grain for food and feed from low-income countries longer term¹⁴, and distribution to end consumers of grain from current large developed country food exporters is not likely to meet the need for a sustainable cost-effective solution in this case. The half-billion smallholder farms in developing countries need to be a significant part of the solution. (ii) *Middle-income countries*: Enhanced by improved policies, and investments in productivity growth, middle-income countries, including Argentina, Brazil, Uruguay, Russia, Ukraine and Kazakhstan, have significant potential for productivity gains and have accounted for a larger share of recent global food exports.

More investment is needed in the generation and adoption of improved, weather-tolerant food crop varieties, through both national research systems and initiatives like the Consultative Group on International Agricultural Research (CGIAR). Average farm yields in poor countries are often less than half those of developed countries—a gap which can be narrowed through better agricultural advisory services and access to complementary inputs. Yet existing varieties are often ill equipped for climate change—and more weather-tolerant crop varieties are needed to reduce shocks to both food production and prices. For example, drought-resistant maize varieties yielded 40 percent more than regular varieties under drought conditions in Sub-Saharan Africa, with similar results for sorghum and millet, suggesting high returns to these research investments. Transgenic drought-resistant maize varieties also yielded up to 20 percent more than non-transgenic drought-resistance varieties¹⁵. Investments in initiatives like the CGIAR offer economies of scale in research with developing countries too small to achieve efficient scale beyond adaptive research. In addition, private sector research often does not focus on crops most important for food security (e.g. cassava and millet). Strengthening protection of intellectual property rights can help to increase private sector investment in areas where there is a commercial return.

Irrigation will continue to be an important source of crop yield improvements and climate resilience, especially in Sub-Saharan Africa and parts of Latin America that still have large untapped water resources for agriculture. Investments are needed to expand irrigated areas. In other regions, where the scope for further expanding irrigated agriculture is limited, greater effort

¹³ Timmer, P. (2010): Reflections on food crises past. *Food Policy* 35:1-11.

¹⁴ FAO, *The State of Food Insecurity in the World* (2011). (*op. cit.*)

¹⁵ Kostandini G., B. Mills, and E. Mykerezi. (2011): Ex Ante Evaluation of Drought-Tolerant Varieties in Eastern and Central Africa. *Journal of Agricultural Economics*, Vol. 62, No. 1, 2011, 172–206

is needed to increase water use efficiency and productivity by addressing the policy, technical, and governance aspects of agricultural water use. Water use in rain-fed agriculture, which accounts for most of agricultural production in developing countries, can be improved through water control and water capture infrastructure, improved management practices and forestation.

Land markets need to be developed to expand area planted to food crops and strengthen property rights to improve the use of existing cropped areas. Land sales and rental markets, accompanied by strengthened property rights, can improve the productive efficiency of existing land areas, and better use of remaining areas available for crop production. Attention is needed to ensure responsible agro-investment from the rising interest from foreign investors, including securing the land and water rights of poor farmers and building recipient government capacity for entering into such deals to the best advantage of the country. Under the right conditions, increased investments (including by multinationals, sovereign wealth funds or government owned corporations) may spur agricultural productivity growth, fiscal revenue, employment, and local incomes.

To increase the responsiveness of the food system to price increases, efforts are needed to better integrate producers with markets and ensure world price signals reach more producers to induce supply response. Investments are needed to expand the reach and quality of rural roads, to improve the collection and dissemination of market information, and to improve technologies for post harvest storage to reduce product losses. Strengthening the bargaining power of smallholders' farmers—especially women—through their producer organizations can help reduce transaction costs, overcome economies of scale, and hence better link them to markets.

Finally, there is a need to improve the access of farmers to appropriate price risk management tools (financial services, including saving mobilization) to reduce the negative impact of price volatility on production decision and help ensure supply response to higher prices. Improving access to infrastructure, maintaining low inflation (precautionary savings), and financial sector development (reflective of risk management capacity) can help to reduce the negative effective effects of price volatility on production decisions¹⁶.

¹⁶ Subervie (2008). The Variable Response of Agricultural Supply to World Price Instability in Developing Countries, *Journal of Agricultural Economics* 59(1):72-92.