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Global Food Security
Sustainable, healthy food for all





insight

Food price spikes and global food markets

Overview

- A large increase in international food commodity prices (a price spike) occurred in 2007/08 and again in 2011 and 2012. These increases were unexpected because the volatility of food prices had generally been low in the previous three decades. The FAO estimates that the 2007/08 price spikes increased the number of people in hunger from 800 million to 1.02 billion globally.
- International food commodity prices are linked to consumer food prices and as a result commodity price spikes increase the price of food in many countries.
- The recent food price spikes have been attributed to a number of different factors, including, a depreciating US dollar, weather and climatic factors, low food stocks, biofuel mandates, policy measures and rising oil prices.
- Some commentators have suggested that food markets may become more unstable in the future, due to an increase in severe weather events, growth in the worlds' population and income, rising oil prices, biofuel production and increased protectionism by some countries.
- Opinions on the level of public intervention required in the food system are polarised between those who see only modest reforms as possible, and those who think much stronger intervention is required. There is agreement that productivity needs to be increased, demand needs to be moderated, post- harvest losses should be reduced and that information on the state of food markets needs be more accurate and accessible.
- More contentious approaches towards food policy include increasing public stocks of cereals, diverting grains from animal feed and industrial use to food at times when spikes threaten, regulating the grain futures market, relaxing biofuels mandates at times when prices start to spike and imposing penalties on countries which use trade restrictions.

Global Food Security (GFS) is a multi-agency programme bringing together the main UK funders of research and training related to food. The GFS Insight series provides balanced analysis of food related research, for use by policy-makers and practitioners.

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Food price spikes

A large increase in food prices (price spikes) occurred in 2007/08 and again in 2011 and 2012. These increases were unexpected, because the volatility of food prices had been low in the previous three decades (the major exception being for rice)[1]. In the 1970s, food price volatility was larger in real terms than the price spikes seen in 2007/08 and 2011/12. For people who spend much of their earnings on food, rising food prices has meant hardship, particularly in low income countries.[1] Furthermore, there is currently a concern that food prices may continue to be volatile in the future.[2] The FAO has estimated that the 2007/08 price spikes increased the number of people in hunger from 800 million to 1.02 billion[3], although this has dropped again recently.

What determines the price of food commodities?

The price of food is determined by shifts in supply (**production**) and demand (**consumption**). Production can change if the area planted or the crop yield varies, whilst consumption patterns can shift because of changes in incomes, tastes, or changes in the prices of substitutes. Ultimately, how production changes in relation to consumption, and the degree to which products can be substituted will affect price.[2]

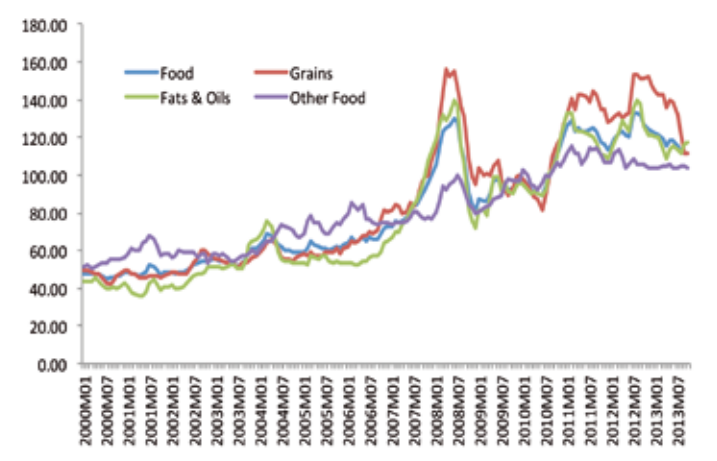

Figure 1: World Bank Global Food Price Index (Source: World Bank DECPG).[4]

Globalisation and agricultural markets

The globalisation of commodity markets has meant that there is greater connection between financial and commodity markets than 20 or 30 years ago. Some degree of price volatility is a natural characteristic of agricultural markets, and there is on-going debate about the role that linkages between financial and commodity markets have played in food price spikes. Empirical evidence broadly suggests that speculation and/or derivative funds have not played a large role in increased price volatility in recent years.[6]

Agricultural commodity derivatives, such as futures, options and index funds have been long established in the United States and Europe and also exist in some emerging market members of the G20, including Brazil, China, India and South Africa.[5] The **FAO Food Price Index** is an internationally traded price of commodities.

Key grain products and their price

In many countries, **wheat and maize** are tradable, so their domestic price generally reflects international prices. However, for commodities that are not widely traded internationally however, such as cassava, sweet potato and in some countries, rice, the impact of world prices on local prices is likely to be low.[7] Grains (i.e. wheat, maize, rice and soya beans) are the major staple food across the globe and are also used for production of meat products. As such, they are a key component of food markets.

Rice is the staple food for much of Asia and is also widely imported and consumed in central and west Africa and in the Caribbean.[2] There is little correlation with the production and consumption shocks of rice with other grains. This is because it is produced on different types of land and largely in different countries, with different groups of customers. The levels of protection in rice markets are generally higher than for wheat and maize and a significantly smaller proportion of the crop is traded internationally. For these reasons the world market price has a smaller influence on domestic prices. Rice is currently not traded on a liquid futures market – futures markets do exist in Bangkok and Chicago, but they attract relatively little business.[2] Price rises affected rice in 2007/08 mainly driven by government intervention (export bans). However in 2011, while the index of prices for cereals came close to its 2008 level, rice prices were unaffected.[5]

Speculation

Trading in commodity markets by speculators can provide liquidity to the market and also play a role in transferring price risk away from food producers (see glossary for commodity market definitions). The dominance of speculators within the market[8] and whether speculation stabilises or destabilises prices[5], is debated. Concerns have been raised about the extent of speculation and there have been calls for tougher regulation to ensure that any destabilising speculative activity is controlled.[2] In Defra's response to the EFRA committee food security enquiry, it is stated that *'On balance, reliable evidence suggests scepticism that speculation in agricultural futures markets has played a significant causal role in agricultural price volatility, but the Government continues to monitor relevant research.'*[9]

Food price volatility

Recent food price spikes

Agricultural commodity prices rose quickly during the second half of 2007 and early 2008, leading to an increase in consumer food prices. Prices then fell rapidly after the second quarter of 2008.[10] Food producer prices and consumer prices increased proportionately less than commodity prices, because agricultural commodities make up only a small proportion of overall production costs of food. The following factors have been attributed to the 2007/2008, 2011 and 2012 price spikes:[2]

- **Weather and climatic factors**, most notably harvest failures of Australian Wheat in 2007 and 2008, failures of the Black Sea region wheat crop in 2010 and the US maize harvest in 2012.[1]
- **Low food stocks**, that could not accommodate short term shocks and **uncertainty about stocks** in some parts of the world, contributed to the 2007/08 price spike. Even expectations of depleted stocks may have led to prices rising sharply in some parts of the world.[5] In the years preceding the spikes, stocks had fallen because Governments took the decision to reduce the high stocks of previous decades which were excessively costly. To meet shortfalls in domestic availability[2], they came to rely more on trade than food security inventories (see 'Food stocks' section for further detail).
- Production of **Biofuels/Biomass** during the 2007/08 period, diverted production away from food crops. This accounted for a significant share of the global use of several crops (e.g. US maize distilled to ethanol).[5]
- **Rising oil prices** that not only increased costs of production, but also contributed to a rise in the demand for US maize for distillation into ethanol.[1]
- **Policy measures** e.g. restricting exports, *ad hoc* reductions in import tariffs and stockpiling.[11] Export restrictions played a particularly significant role in the rice and wheat markets, restricting supply to international markets, contributing to the price peaks in 2008.[11] Some governments in importing countries also stockpiled rice, driving prices up further.[11]
- **Depreciating US Dollar** in the years before and up to the peak of the 2007 and 2011 price rises, caused the dollar dominated international commodity prices to rise.[5]
- A **slowdown in cereal yield growth rate**, before the price spikes.[1]
- There is **disagreement about the role of speculation** as a driver of price increases and increased market volatility[5] (see 'Globalisation and Agricultural Markets' section for further detail).

Household impacts of price spikes

The increase in household food prices is widely believed to have impacted the poor the greatest, because they spend a higher proportion of their income on food.[12] The FAO states that in 2007/2008, an additional 115 million people were pushed into chronic hunger, mainly because of high food prices.[13] Furthermore, research has indicated that families may be forced to turn to cheaper, poorer quality food or skip meals to stretch their budget.[14] Few low income countries had safety nets in place e.g. public stocks or cash transfers to smooth incomes, with the objective of reducing vulnerability,[15] that could be scaled up when prices rose, or that could offer protection to the large proportion of the population who were vulnerable3. A lesson learned from the 2007/08 spike was that if safety nets are not already in place before a price spike, it is not possible to put them in place quickly enough to make a difference.[1]

There is a suggestion that as the world gets richer, consumers will become less sensitive to prices, so a higher price increase will be needed to reduce consumption and control demand. However, any increases in price would affect the poor the greatest.[16] A joint Institute for Development Studies – Oxfam research project: '*Life in a Time of Food Price Volatility*'[14] is tracking the impact of food prices on people living in poverty in 10 countries over four years. Emerging research has also suggested that in the rural areas of some developing countries, price rises may have resulted in more employment and better wages.[1]

Future challenges to food price stability

Periods of high food price volatility have been experienced in recent years; however (except for the case of grains) this is not exceptional, with periods of high volatility experienced in the past. Some commentators have therefore stated that volatility levels will drop back to historical levels over the coming years. Despite this, there are factors that may lead to a permanent increase in volatility particularly for grains prices, although their importance is currently uncertain.[2] These are outlined below:

- **Severe weather events** are likely to increase in the future,[17] leading to more incidences of extreme rainfall, drought, frost, pests and disease and the detrimental interaction between weather and air quality.[18]
- A **growing world population** may increase the demand for food relative to supply, lowering the availability of stocks, resulting in an increase in price volatility. It is also expected that the projected increase in affluent diets will lead to growing meat consumption, stimulating increased demand for animal feed[7]. This reduces the availability of land to grow food for human consumption (see Global and Agricultural markets section for further information).[19]
- **Barriers to trade** for agricultural products in developing countries and between developing and developed countries contribute to 'Thinning' of international markets, by reducing the number of buyers or sellers.[5]
- Agricultural commodity prices are being increasingly correlated with **oil prices** at an international level. Oil prices affect agricultural input prices directly and indirectly e.g. through the price of fuel and fertiliser and also through the increasing demand for biofuels. It has also been said that forecasting oil prices into the medium term verges on the impossible[1].
- **Biofuels** now account for a significant proportion of global use of a number of crops e.g. sugar cane, oilseeds, coarse grains and sugar beet.[5] Biofuels can lead to 1) higher food prices in the medium term, by increasing the competition for land, 2) exacerbation of price spikes, because biofuel mandates do not currently enable a shift from fuel to food production during periods of high food prices. Research carried out by Defra shows that up to 15% of a hypothetical spike in the price of 'coarse grains' could be avoided if the EU removed its biofuels mandate at the same time as prices started to spike.[20]

Food stocks

Since the 2007/08 price spikes, there have been proposals to hold more food reserves in order to meet nutritional requirements and to control food price instability.

- **Emergency food reserves** may be appropriate in developing countries, when there are likely to be long lags between the import requirements of food becoming apparent and its arrival.[11] Public stock holding might be necessary in such situations, because poor people may lower their calorie intake in response to changes in prices. Reserves for these people are based on the principle of need, rather than to stabilise price.[10,21]
- **Buffer stocks in developing countries** have been suggested as a means to control price instability. Public stockholding has high associated costs however, and could discourage private sector activity.[2,22,11]

Can the stability of food markets be improved?

Recent approaches towards food policy

Agricultural policy has changed over the past 50 years, with an increase in the liberalisation of food markets since the 1970s and reduced protectionism by developed countries. In the late 1990s, futures contracts were deregulated, and there has been an increase in the amount of speculation taking place in agricultural commodity markets.[23]

Potential improvements to Global Food Markets

The 2007/08 food price crisis exposed weaknesses, both in relation to the provision of market information at the global level, and also into the coordination of policy responses to food price volatility.[5] In a report by a number of international organisations *'Price Volatility in Food and Agricultural Markets: Policy Responses'* it was acknowledged that there is a need for better preparation and more rapid and consistent policy responses in times of crisis.[5] Views about the level of public intervention needed to stabilise prices are polarised between those who see only modest reforms as possible[11] and those who think that much stronger intervention is required.[15,1]

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The table below outlines proposed interventions to stabilise grains markets.

Proposal	Potential positive outcomes	Potential negative outcomes and barriers
Increase public stocks of cereals.	– Could help stabilise prices.[24] – Could act as a famine buffer in developing countries.[25]	– Governance would be difficult.[1] – Private trading may divert attention to second-guessing public stock managers.[1] – Public stockholding discourages and crowds out private stockholding,[2,22] because the private sector comes to rely upon the availability of the subsidized public inventory. – Some see the costs as too high.* [1] – Interventionist, distorting the signals that are provided by market prices.
Diversion of grains from animal feed and industrial use to food at times when spikes threaten.	– Grain diversion may have some impact in middle income and high income countries where much grain goes to feed livestock, particularly if complemented by other measures.[26]	– At the international level, the co-ordination and governance of such a scheme would be difficult. [1,26] – Since grain diversion is uncommon in low income countries, it would have limited benefit to their poorest people.[26]
Regulation of futures markets for grain.	– Proposed as a means of combating food price volatility.	– There is little appetite among governments for more regulation.[1] – The potential benefits of futures markets may be lost e.g. signalling future scarcity or abundance, which may inform demand or supply decision-making.
Relaxing biofuel mandates at times when prices started to spike.	– This would help reduce the competition for land between food crops and biofuel production. The European Commission is currently considering setting a cap on the use of food-based biofuel.[27]	– This could only work so long as returns to biofuels are not market-driven.[28]
Disciplines on export restrictions.	– Would help prevent the exacerbation of international price increases.	– There has been no credible way to obtain such commitments from grain exporters.[1]

*For example a 70 million tonne public facility may cost more than $1 billion a year to operate.[1]

Recent developments in agricultural policy

Increased co-operation between Governments is taking place globally. **The Group of Twenty (G20)** is a forum for its members' economic cooperation and decision making. In 2008, the first G20 Leaders Summit was held, and the group played a key role in responding to the global financial crisis.[29] Furthermore, in January 2014, the EU reached an agreement to update rules that will improve the way European commodity markets function. The **Markets in Financial Instruments Directive (MiFID)**[30] agreement is still waiting to be formally approved by the assembly and national governments to take effect.

The FAO has established the **Agricultural Market Information System (AMIS)**, so that more accurate and available information on the state of food markets can be publicly available, for the benefit of the entire sector.[1] The aim is to promote early discussion among decision makers about critical market conditions to encourage the coordination of policies and the development of common strategies.[31]

To meet higher food consumption demands, respond to a changing climate and reduce price pressures, greater **investment in research, development and extension infrastructure** is required[13]. Modelling studies have shown that a small improvement in agricultural productivity can lead to significantly lower global price rises over the longer term.[13,32] Accelerating agricultural growth rates could therefore ease pressure on markets[1], particularly in low income countries which are vulnerable to spikes. Furthermore, reducing post-harvest losses by improving storage and transportation could increase resilience in the face of volatility.

Glossary of commodity market terms

- **Agricultural commodities** are marketable goods, which are produced in large quantities, and traded on an exchange in standard amounts. A commodity market is a physical or virtual marketplace for buying, selling and trading raw or primary products.[19]
- **Market liquidity** is the degree to which an asset can be bought or sold in the market, without affecting the asset's price. Liquidity is characterised by a high level of trading activity. Assets that can be easily bought or sold are known as liquid assets.[19]
- A **futures contract** is a contractual agreement to buy or sell a commodity at a pre-determined price in the future.[19] These contracts are standardised, detailing the quality and quantity of the underlying asset. Futures contracts are usually unfulfilled, but through hedging (see below) they are used to guarantee the price of a physically traded commodity. They can therefore reduce volatility because they insulate the market against price spikes and signal any expected future market scarcity.
- **Hedging** is the use of futures contracts to fix the price of a physically traded commodity at some point in the future.
- **Speculators** trade futures contracts, with the intention of making a profit from prices changing over time, and bear the price risk transferred from hedgers. Speculators attempt to anticipate future price movements, trading contracts with higher than average risk, in return for a higher than average profit[19] (see Speculation box for further detail).
- **Market Thickness** refers to the number of buyers and sellers. Few transactions take place in a thin market, so their prices are often more volatile and their assets are less liquid. If supply or demand changes abruptly, resulting in more buyers or sellers or vice versa, prices will typically be impacted.[19]

References

1 Wiggins, S. & Keats, S. Looking back, peering forward: what has been learned from the food-price spike of 2007-2008? ODI (2013).

2 Gilbert, C. L. & Morgan, C. W. Phil. Trans. R. Soc – B. 365, 3023-3034, doi:10.1098/rstb.2010.0139 (2010).

3 FAO. The State of Agricultural Commodity Markets. High food prices and the food crisis - experiences and lessons learned. (2009).

4 The World Bank. Global Price Trends. Food Price Watch (2013).

5 FAO et al. Price Volatility in Food and Agricultural Markets: Policy Responses. (2011).

6 Irwin, S. H. and Sanders. The Impact of Index and Swap Funds on Commodity Futures Markets: Preliminary Results. (OECD, 2010).

7 Benson, T. et al. Food Policy 38, 47-58, doi:10.1016/j.foodpol.2012.10.001 (2013).

8 World Development Movement. Broken Markets. How financial market regulation can help prevent another global food crisis. (2011).

9 Defra. Defra's response to the EFRA committee food security enquiry. http://data.parliament.uk/writtenevidence/WrittenEvidence.svc/EvidenceHtml/4390 (2013).

10 Wright, B. Recent Agricultural Price Volatility and the Role of Grain Stocks. (International Food & Agricultural Trade Policy Council, 2010).

11 Defra. The 2007/08 Agricultural Price Spikes: Causes and Policy Implications. (2010).

12 GFS & ESRC. Global Food Systems and UK Food Imports: Resilience, Safety and Security. Discussions from the ESRC Public Policy Seminar 30 March 2012. (2012).

13 Linehan, V. et al. Global food production and prices to 2050. Scenario analysis under policy assumptions. (Australian Government, 2013).

14 Hossain, N. et al. Squeezed: Life in a Time of Food Price Volatility, Year 1 Results. (Institute for Development Studies and Oxfam, 2013).

15 DFID. Cash Transfers. (2011).

16 Davies, G. (Defra) Personal Communication. (2013).

17 IPCC. Summary for Policymakers. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. (2012).

18 Benton, T. Severe weather and UK food chain resilience. (Global Food Security Programme, 2012).

19 Investopedia. Dictionary, www.investopedia.com/dictionary/. (2013).

20 Durham, C., Davies, G. & Bhattacharyya, T. Can biofuels policy work for food security? An analytical paper for discussion. (Defra, 2012).

21 Wright, B. International Grain Reserves And Other Instruments to Address Volatility in Grain Markets. (The World Bank, 2009).

22 Miranda, M. J. & Helmberger, P. G. American Economic Review 78, 46-58. (1988).

23 World Development Movement. What is the problem? (2013).

24 Serra, T. & Gil, J. European Review of Agricultural Economics 40, 507-528. (2012).

25 Evans, A. Governance for a resilient food system. (Oxfam, 2011).

26 Davies, G. Removing Biofuel Support Policies: An Assessment of Projected Impacts on Global Agricultural Markets using the AGLINK-COSIMO model. (Defra, 2012).

27 Van Noorden, R. Nature 499, 13-14, doi:10.1038/499013a (2013).

28 Locke, A., et al. Diverting grain from animal feed and biofuels: can it protect the poor from high food prices?. ODI Report. (2013).

29 G20. About G20, www.g20.org/about_G20. (2014).

30 European Commission. Instruments Services Directive-Markets in Financial Instruments Directive (MiFID), http://ec.europa.eu/internal_market/securities/isd/mifid/index_en.htm (2014).

31 AMIS. Agricultural Market Information System: The Rapid Response Forum, www.amis-outlook.org/amis-about/forum/ (2013).

32 Foresight. The Future of Food and Farming. (2011).

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This review has been prepared by the science writer for the GFS programme, Theresa Meacham, and provides a representation of the current state of knowledge in a particular area. The review will help to inform policy and practice, which is based on a wide variety of factors, including evidence from research. The review does not necessarily reflect the policy positions of individual partners.

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