



Looking back, peering forward

Food prices & the food price spike of 2007/08

Steve Wiggins and Sharada Keats

Overseas Development Institute

28 March 2013

ODI Shockwatch: Managing risk and building resilience in and uncertain world

Acknowledgements

Thanks to John Farrington and Andy Norton of ODI for their useful comments on an earlier draft.

We are grateful to the following who so generously shared their time and expertise in interviews about prospects for food prices: Phil Abbott of Purdue University, Ron Trostle of USDA, Will Martin of the World Bank, Chris Gilbert of the University of Trento, Mark Rosegrant of IFPRI, and Ignacio Perez of OECD.

Thanks also to Pearl Samandari Massoudi who helped us review the literature. Helen Hynes from the Agricultural Development and Policy team helped us with copy editing.

The interpretations and opinions expressed in the report are, however, not necessarily those of the above mentioned persons, nor of Overseas Development Institute. The authors are solely responsible for any errors and omissions.



This research was funded by UK aid from the Department for International Development. Its conclusions do not necessarily reflect the views of the UK Government.

Overseas Development Institute
203 Blackfriars Road
London SE1 8NJ, UK

Tel: +44 (0)20 7922 0300
Fax: +44 (0)20 7922 0399
www.odi.org.uk

Disclaimer: The views presented in this paper are those of the author(s) and do not necessarily represent the views of ODI, our partners, or those who we interviewed.

Contents

	Contents	i
	Tables, figures & boxes	ii
	Abbreviations	iv
	Summary	v
1	Introduction	1
2	Looking back	2
2.1	Causes of the 2007/08 spike in prices of cereals on international markets	2
2.2	Price transmission: relating international price rises to local prices	13
2.3	Public responses to the price spike	16
2.4	Impacts	22
3	Peering forward	35
3.1	What will influence staple food prices over the next 10 years?	35
3.2	Discussion: future prices	41
4	Policy implications	43
4.1	International concerns	43
4.2	Domestic concerns	45
4.3	Timely analysis for the future development of prices	46
4.4	Discussion: wider perspectives	48
	References & bibliography	50
	Appendix A: Changes and trends in under-fives Stunting, Underweight, and Wasting available before, during and after the 2007/08 food price spike	55

Tables, figures & boxes

Tables

Table 1: Crisis response preparedness across countries currently flagged as greatly affected by food price changes	18
Table 2: Net buyers among smallholder households	23
Table 3: Measures of Rural poverty in Bangladesh	29

Figures

Figure A: Prices of maize, rice and wheat 2000 to 2012, constant US\$	v
Figure 1: Prices of maize, rice and wheat 2000 to 2012, constant US\$	2
Figure 2: Growth of world cereals production, 1961 to 2010	3
Figure 3: Stock-to-use ratios for cereals, since 1970/71	4
Figure 4: US ethanol production and crude oil price index	5
Figure 5: Trade and the rice price, 2007 to 2009	7
Figure 6: Effect of index investment on futures prices for maize and wheat during the 2007/08 price spike	9
Figure 7: Overseas Development Aid to agriculture, DAC countries and multilateral agencies, 1971–2008	11
Figure 8: Trends in agricultural output, input use and total factor productivity (TFP), by decade since 1961	12
Figure 9: Price transmission for rice in Asia	14
Figure 10: Countries with high levels of food insecurity and recurring food crises	15
Figure 11: Public/private coordination failure in cereal importation	16
Figure 12: Share of households surveyed in CAR benefiting from outside support in case of shocks, by shock and source of support (%)	19
Figure 13: Growth of production of cereals, before and after the 2007/08 spike, average annual growth rates	21
Figure 14: Impact of higher world price for rice on Indian households	24
Figure 15: Coping by households in Kandy, Sri Lanka	26
Figure 16: Coping in rural Cambodia	27
Figure 17: Coping in Bangladesh	27
Figure 18: Coping responses cited as ‘common’ or ‘very common’ in qualitative surveys	28
Figure 19: Change in prevalence of children under 5 underweight from before and after the price spike	33
Figure 20: Maize / Coarse Grains prices and price projections	35
Figure 21: Wheat price projections from OECD/FAO Outlook	36
Figure 22: Rice prices and price projections	36
Figure 23: Oil price projections from the US Energy Information Administration	37
Figure 24: Impact of a 25% increase/decrease in crude oil price on world commodity prices (average over projection period)	37
Figure 25: Impact of a 5% increase/decrease in annual cereal yield on world commodity prices (average over projection period)	38

Figure 26: Uses of coarse grains in the USA – projections 2012 to 2021	39
Figure 27: Uses of coarse grains in China – projections 2012 – 2021	40
Figure 28: Stock to use ratios for maize, rice and wheat globally, 1990/91-2012/13	41
Figure 29: Options for responding to food price spikes and their consequences	43
Figure 30: Map of countries covered before, during and after 2007/08 in the WHO database	55
Figure 31: Changes in WAZ, HAZ, WHZ, (% of under-fives) Southern Africa	56
Figure 32: Changes in WAZ, HAZ, WHZ, (% of under-fives) Eastern Africa	57
Figure 33: Changes in WAZ, HAZ, WHZ, (% of under-fives) Horn of Africa	58
Figure 34: Changes in WAZ, HAZ, WHZ, (% of under-fives) Northern Africa	58
Figure 35: Changes in WAZ, HAZ, WHZ, (% of under-fives) Western Africa	59
Figure 36: Changes in WAZ, HAZ, WHZ, (% of under-fives) Middle East	60
Figure 37: Changes in WAZ, HAZ, WHZ, (% of under-fives) Latin America, Caribbean	61
Figure 38: Changes in WAZ, HAZ, WHZ, (% of under-fives) South Asia	63
Figure 39: Changes in WAZ, HAZ, WHZ, (% of under-fives) South-East Asia	64
Figure 40: Changes in WAZ, HAZ, WHZ, (% of under-fives) East Asia	65
Figure 41: Changes in WAZ, HAZ, WHZ, (% of under-fives) Europe	65

Abbreviations

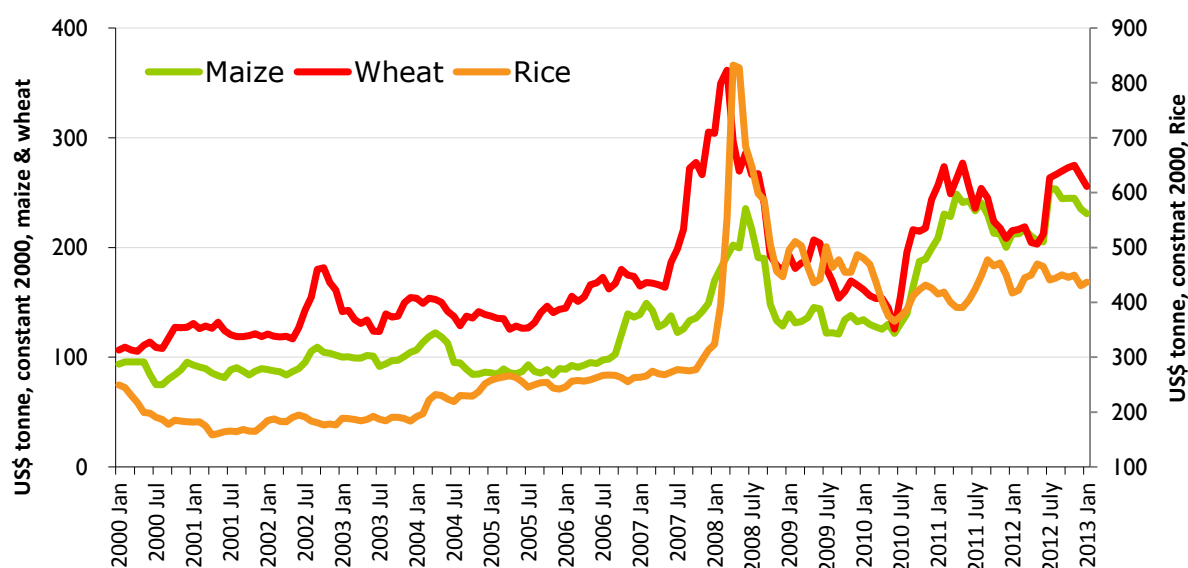
ACS	Agricultural Capital Stocks
BISP	Benazir Income Support Programme (Pakistan)
CFS	Committee for Food Security
CIT	Commodity index trader
DAC	Development Assistance Committee
DDGS	Dried Distillers Grains with Solubles
EIA	Energy Information Administration (USA)
EPA	Environmental Protection Agency (USA)
EU	European Union
FAO	Food and Agriculture Association of the United Nations
FAO(STAT)	Food and Agriculture Organisation of the United Nations (Statistical Service)
FEWS(NET)	Famine Early Warning Systems (Network)
GAM	Global Acute Malnutrition - low weight for height plus oedema cases
GDP	Gross Domestic Product
GIEWS	Global Information and Early Warning Systems (FAO)
GTAP	Global Trade Analysis Project
HAZ	Height for age Z-score: a measure of stunting
HLPE	High Level Panel of Experts
IFPRI	International Food Policy Research Institute of the CGIAR
IMF	International Monetary Fund
LIC	Low Income Countries (World Bank classification)
MIC	Middle Income Countries
MTBE	methyl tert-butyl ether (once a petroleum additive)
ODA	Overseas Development Assistance
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
PSNP	Productive Safety Net Programme (Ethiopia)
RFA	Renewable Fuels Agency
SDR	Special Drawing Rights
SSA	Sub-Saharan Africa
TPF	Total Factor Productivity
US\$	United States Dollars
USDA	United States Department of Agriculture
USSR	Union of Soviet Socialist Republics
WAZ	Weight for age Z-score: a measure of underweight
WFP	World Food Programme of the United Nations
WHO	World Health Organisation of the United Nations
WHZ	Weight for height Z-score: a measure of wasting

Summary

Introduction

The spike in prices of cereals on world markets in 2007/08 was as unwelcome as it was unexpected. For poor and vulnerable people it spelt hardship as the costs of cereals in many parts of the developing world rose sharply. For leaders, it came as a shock given that for more than three decades previously, real food prices had fallen on world and many national markets. The benefits of the green revolution had come to be taken for granted.

Figure A: Prices of maize, rice and wheat 2000 to 2012, constant US\$



Source: Compiled from IMF commodity statistics, deflating prices by the US GDP deflator

These events prompted much discussion about the causes, how to respond, and what it might imply for the future of food supplies and prices. Much has been written, often close to the events, with imperfect information. It is now five years since the price spike: with clearer information it should be possible to gain better insight into the event. Hence this paper aims to review what has been learned from the food price spike of 2007/08, what may be expected for food prices in the future, and what the policy implications may be.

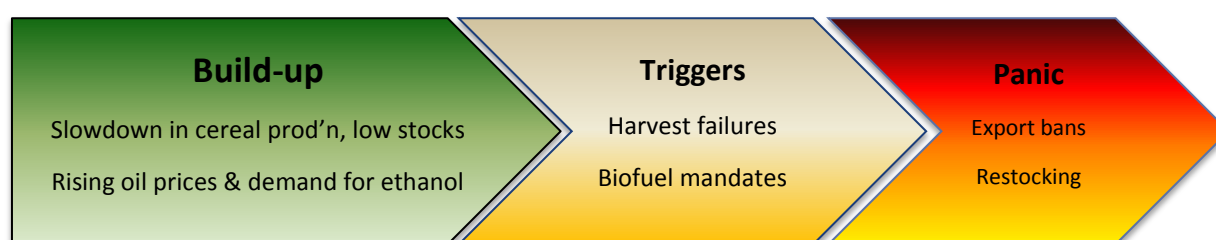
This review is not comprehensive: it focuses on the insights that have emerged in the last three years that modify initial understandings. While the key points from what was understood in 2009 are recounted briefly, those who would like more of the background can benefit from some excellent reviews, few better than the IFPRI monograph by Headey & Fan published in 2010.

The report has been compiled by reviewing the literature, in particular that which has appeared since 2009. Overseas Development Institute produced a set of reports between 2008 and 2010 that looked at what was known about the price spike and its effects at that time: this report builds on those understandings. In addition, key informants were interviewed about the factors experts consider most likely to influence prices over the next ten years so, and the uncertainties that apply.

Looking back at the 2007/08 price spike: causes, responses and impacts

Causes

A useful way to understand the spike is as an event stemming from many factors operating on different time scales that came together in a remarkable conjunction: a ‘perfect storm’. The argument here distinguishes the *conditions that made possible the spike* — mainly a slowdown in the growth of cereals production, stocks depleted to a level at which short-term shocks could not be accommodated, rising oil prices and the associated extraordinary increase in the demand for US maize to be distilled to ethanol; from *short term triggers* of harvest failures and biofuel mandates that accelerated price increases; and from the *very short term, panic reactions* of governments, traders and consumers whose restocking, export limitations and hoarding aggravated the initial price increases to produce an extraordinary spike.



Debate continues about the relative importance of the different factors. The spike, however, arose from the interplay of several factors: in the absence of any of which the spike would not have occurred; hence it is difficult to apportion weights to these.

Most of the contributing factors are reasonably well understood and agreed: but there remains contention over the role of index investment ('speculation') on futures markets for maize and wheat. Despite the many papers addressing this issue, the arguments continue. To some extent this reflects the technical difficulties of proving the argument one way or the other; but increasingly it seems that the very different perspectives of those with opposing views means that they tend to cite different literature and adopt different standards of evidence. The balance of the evidence seems to show that index investment may have exacerbated the spike in maize and wheat prices, but that this cannot explain more than a small part of the large price increases seen. That the largest spike occurred for rice for which there was little or no such investment also suggests that this was a minor factor.

Differences in perspective are also found in interpretations of unusual, unexpected and unwelcome outcomes in markets. These remind us that markets will always be less than perfect: but does that mean that they need root-and-branch reform or replacement? In price spikes, some see the imperfections of markets as greater than their benefits, imperfections that thus demand remedy. Others see these events as brief crises within systems that generally work well: systems that are sufficiently complex that they defy simple correction, and where unwise intervention may lead to even worse outcomes.

How much did increases in cereals prices on international markets push up domestic prices in developing countries? Three broad patterns of transmission can be identified. Very large Asian countries, such as China and India, were insulated from world markets by large (and costly) public stocks and restrictions on trade. Other developing countries with reasonable access to world markets saw a significant if muted transmission to their markets, so that domestic prices of staples rose considerably, with rises in the range 30% to 70%. A third group of countries, mainly low income especially in Africa were insulated from world markets by high transport costs; and in some cases additionally by the importance of little-traded staples such as cassava, yams, millet and sorghum in local diets. Food prices in these countries depended far more on domestic harvests, as well as on restrictions to trading regionally with neighbouring countries, than on world prices. In some parts of inland Africa food prices rose at the same time as the spike on world markets, but domestic inflation and harvest losses were probably the causes, not the international price spike.

Public responses

Most governments tried hard to react to higher world food prices. Low income countries (LIC), however, despite the additional aid many received, struggled to make a difference. They had few means by which to mitigate price rises, either at the border, or on domestic markets. Most of the buffering of international price rises came through the natural protection of high transport costs to ports. Not that this was necessarily an advantage for those LICs distant from the sea: in some cases protection left them highly vulnerable to price volatility from domestic harvests.

When it came to protecting vulnerable citizens, again LICs often faced the twin challenges of not having safety nets in place — both policies and agencies — that could be scaled up when prices rose, combined with not enough resources to provide adequate protection in countries where half or more of the population were in danger of impoverishment and hunger.

Most countries tried to stimulate domestic production. Again, however, LICs had few means by which to do so: distribution of seed and fertiliser were costly exercises, while promising farmers higher prices was unthinkable for lack of funds.

Middle income countries, on the other hand, often had more scope for action, thanks to their greater administrative capacity, deeper funds to draw on, and often a smaller share of population to protect. Where agriculture had a smaller share of the economy, offering farmers higher prices or subsidised inputs was feasible. Having the means and acting effectively or efficiently, however, are not necessarily linked. For example, Argentina tried to protect consumers by restricting and taxing food exports, the main effect of which was to undermine production that made it all the harder to hold down domestic prices.

Across countries, higher food prices were commonly seen as a threat to the lives of poor urban households with less appreciation that poor rural households might be equally vulnerable. In any case, for many countries it was administratively easier to protect urban rather than rural households. Urban households, moreover, were better placed to protest in the face of price increases. Hence responses tended to show a bias to urban areas.

Overall, most surveys report that not many vulnerable households received assistance from the state during the food price spike. Despite considerable public efforts, for most threatened households it was their own ability to cope that mattered.

Impacts

Five years after the food price spike, impacts are not entirely clear. Models and surveys predict and show hardship and suffering for households vulnerable to rising food prices. Yet national surveys suggest that food security and nutrition improved in many countries.

This is not so surprising: changes in food prices are only one factor affecting income, food security and nutrition. At the time of the price spike developing countries were also experiencing rising costs of fuel as the oil price soared, the start of the effects of the financial crisis in Europe and North America, and, most important of all, the performance of their own economies in creating jobs and incomes — and the performance of their governments in providing public goods and services, and social protection. Trying to separate the effects of higher prices for staple foods from other confounding variables is a challenge.

There is furthermore a problem of time scales. Short term impacts of higher prices can be strong since there is little time to adjust consumption or to earn more from the opportunities that come with higher prices: with time, however, households, farms and firms may adjust, public policy may help, and so negative effects may be much mitigated. On the other hand, with time short-term coping may prove difficult to sustain and vulnerable households may slide into deep poverty and destitution as they exhaust their options.

Any rise in prices of essential items such as staple foods will entail some hardship. The more important question is whether the price spike resulted in some hardship for vulnerable households, or whether it has led to permanent damage. If the latter were the case, then it should show up in the nutrition of infants: they are usually the most vulnerable members of vulnerable households. Yet the statistics from national surveys

conducted before and after the spike do not show a general trend towards damage: on the contrary, in 37 out of 52 countries, child nutrition improved rather than worsening.

The simple interpretation may be that for vulnerable households, the food price spike was not that much of a problem provided that the household lived in a fast-growing economy with a reasonably competent government capable of providing the public goods and services to ensure that growth provides wide benefits and able to protect the vulnerable. Those vulnerable households living in countries with slow growing economies, with governments barely able to fulfil their functions and unable to react effectively to the spike, may well have suffered.

Looking forward: future staples prices

Forecasts by leading groups at FAO/OECD and USDA agree that staple food prices are expected to fall to by around 10% for maize, 15% for rice and 5% for wheat from recent levels in real terms over the next 10 years. That will, however, leave them at a higher level than before the price spike: expected to be some 20% to 70% above the levels seen in the mid-2000s.

Many uncertainties apply to the forecasts including the oil price, the medium term future of which is anybody's guess, but which will have a strong effect through the demand for biofuels which in addition will be affected by policy. Unpredictable technical advances will influence productivity gains in agriculture and the scope for biofuels. Global warming will change climates and make them more variable, leading to less predictable harvests. The growth of emerging economies will increase food demand; with considerable uncertainty over the evolution of diets, consumption of livestock, and the consequent demand for feed grains.

Some changes will make food prices less stable. Rising incomes in the developing world tend to make demand for staple foods less elastic, thereby amplifying price rises in response to supply shocks. Biofuel mandates also reduce flexibility of demand. On the other hand, increasing integration of markets across the world will tend to reduce the overall variance in cereals harvests. Technical advances could push prices either way: down if through improved productivity; up if encouraging stronger demand for ethanol for instance via drop-in fuels — forms of ethanol and biodiesel processed so that they can be used in current engines without modification.

Projections, moreover, are based on models that cannot easily handle shocks. By their nature, shocks tend to be unpredictable: the least foreseeable can have the strongest effects. Shocks may become more frequent as climate change makes extreme conditions more common.

The implication of shocks is to build more resilience into the system. But that involves some difficult judgments about how strong and frequent future surprises may be. If 2007/08 was a perfect storm, unlikely to be repeated more often than one in 30 years, then how much priority should be given to preventing that rare event, when there are so many other things that might be done with resources in the meantime? At the margin, the food price shock was unwelcome, but it was hardly a catastrophe in any given locality on the scale of other shocks that arise, such as floods and earthquakes.

Policy implications

Stabilising international prices

Since the spike several proposals for dealing with the spikes have largely fallen by the wayside. Increased **public stocks of cereals** would prevent spikes, but the costs are considered too high, the governance too difficult, and the risks of interfering with private trading are not to be discounted.

Diversion of grains from animal feed and industrial use to food channels during times when spikes threaten could potentially head off a spike; but this is probably an option only for some middle income countries. At international level the co-ordination and governance of such a scheme would be next to impossible (Locke et al., 2013).

In the contentious debate over the role of **index investment** ('speculation') in the price spike, some now press for regulation of such investment citing the precautionary principle. In practice the US has introduced some

controls on trading on the commodities futures; although there seems little appetite amongst governments in the US or elsewhere for anything more than these.

Relaxing biofuel mandates at times of stress would help, but if the US did not relax them when the worst drought in living memory hit farms in the Midwest in 2012, then there is little hope of this.

At the time of the spike there were calls for *disciplines on export restrictions*, yet there seems to be no credible way to obtain commitments from grain exporters.

What then has been agreed or is still on the table? Having more accurate and detailed *information on the state of food markets* publicly available should benefit almost everyone, from international organisations to governments to private traders. FAO has thus been mandated to set up an improved Agricultural Market Information System (AMIS) which it is currently developing.

Accelerating the growth rate of cereals, especially in countries vulnerable to price spikes, would ease pressure on markets. Hence there have been repeated calls for stimulating production, backed by increased aid for agriculture. Whether through public investments or by private reaction to higher prices, there has been indeed been such an acceleration.

Some calls have been made to moderate rising demand for grains, other than from biofuels, by reducing the amount of *food that is wasted* — thought mainly to be by consumers in OECD countries, and between field and market in the developing world. Concrete proposals for reductions are awaited.

Even more politically difficult is the question of *meat consumption* and the likely patterns of diet that might emerge in growing economies in the near future, and their implications for cereals demand.

Domestic policy response

The food price spike has challenged the previous conventional wisdom that domestic price stabilisation is costly, difficult and likely to be either ineffective or counter-productive. Given volatility on world markets there may be case for additional, precautionary measures domestically to guard against such events. Southeast Asia has had some success. Countries such as Indonesia and Thailand have been able to stabilise their cereals prices by public control of as little as 5% of the total volume of grain: leaving most of trading in private hands and thereby avoiding the sort of rigidities and costs associated with heavy public intervention in markets.

Much of this discussion assumes low income countries have the funds and administrative capacity that middle income countries have. For most low income countries, however, the options may be considerably more limited for lack of these conditions. Consequently increasing domestic production may be the most feasible option for LICs, especially given that they usually have under-used land and labour.

With respect to protecting the vulnerable against the effects of price spikes, the main lesson learned is that of having systems in place that can be expanded, adapted and deepened to accommodate increased needs and perhaps larger numbers in need. It is more or less impossible to create functioning systems within the weeks and months of a price spike.

Once again, there is a marked contrast between middle income countries that often do have safety nets in place, and most low income countries that do not.

Timely analysis for the future development of prices

What developments need to be tracked to have timely information and analysis of the likely evolution of food prices, making it less likely that unpleasant surprises such as the 2007/08 price spike will catch most observers off guard? Five concerns can be picked out, as follows, roughly in order of priority or by their importance in the near future.

Stocks of cereals. Better information on stocks would alert both traders and governments to moments when risks of price spikes threaten, even if it is not easy to get accurate information. The AMIS initiative at FAO addresses this issue; although it remains to be seen how much improvement can be made.

Oil prices, biofuels production, policy and investment. Oil prices affect food prices directly, but their influence on food prices could become huge if oil prices remain above US\$100 a barrel. At these prices, biofuels produced from tropical feedstock such as sugar cane, palm oil, cassava and sweet sorghum should be cheaper than gasoline/petrol and diesel. Given the amounts of transport fuels used, the demand for land for biofuel feedstock could become very large indeed. Two uncertainties currently prevent this: uncertainty over the future oil price; and, lack of clear policy and the means and will to make the heavy investments in storage, distribution and modifications to the vehicle fleet to move to a transport system powered largely by biofuels.

Changing diets and their implications for the demand for animal feed. Will diets in the developing world move towards the patterns seen in North America and Northern Europe, with large intakes of livestock produce? Or might they evolve towards regional patterns, reflecting local preferences? Future diets will make a significant impact on the prices of staples through demand for feed grains including soybeans. Changing consumer preferences and public policies need monitoring.

In the longer term, two other issues need to be kept under review, as follows.

Climate change, more variable weather, emerging patterns for harvests. It is likely that changes to weather patterns and variability will become increasingly apparent this decade and come thereafter ever more strongly to influence agricultural production. Information on the changes, their impacts on agriculture, on adaptation by farmers and technical progress that assists adaptation will be needed; and,

Challenges of sustainable and low net emission agriculture. Agriculture will have to become sustainable over the next two decades; above all in making economical use of irrigation water, limiting use of external inputs such as fertiliser and crop chemicals, reducing soil erosion and degradation, restricting conversion of valued habitats such as tropical forests, peat and wetlands to new fields and pastures, and capturing carbon within farming systems. Changes to farming systems as well as the drivers of these changes in technical advances, changes in factor prices reflecting scarcity and policies will need to be tracked.

Wider perspectives

Turning old problems into opportunities

The food price spike has also directed attention to two longstanding issues. One has been the disappointing rates of agricultural growth in some countries and especially those of Sub-Saharan Africa. A revival of interest in agriculture was already underway, but this has been lent urgency by the food price spike.

The other has been child malnutrition. There was already concern that progress towards meeting the food security and nutrition targets of the first Millennium Development Goal was lagging, with Africa and South Asia in particular making too little progress. Early assessments that the spike had increased the number of undernourished to around one billion persons thus came as a rude shock. Since 2007 there have been several new international initiatives to combat child malnutrition.

In both cases, leaders have been reminded that while progress has been inadequate, raising food production or reducing child malnutrition are both neither difficult nor complicated. Many of the necessary actions — for example, funding agricultural research, building and maintaining roads to rural areas, providing clean water and primary health care — are well-known and proven: all they need is funding and political backing. In this sense, they are opportunities, perhaps even easy wins.

What is more, the evidence now emerging on increased food production and progress on reducing child malnutrition suggests that the opportunities are being seized. Quite apart from the intrinsic value of these gains, this should remind leaders that when determined action is taken, changes can be made — even in areas previously seen as ‘difficult’. They were only ‘difficult’, it would appear, because before they got too little political support and inadequate investment.

Monitoring changes in welfare and key contributory factors

Five years after the spike some things have become clearer, but other things are maddeningly still not understood. The information on prices and the proximate causes of the crisis is there; but the factors that transmit this through to outcomes in incomes, poverty and food and nutrition security are not monitored as

closely as they need to be. The single largest gap in readily available sources concerns changes in employment and wages in rural areas: did the higher prices stimulate farmers to hire more labour? Did farmers earn more and spend this locally thereby creating additional activity with more jobs and better wages? There seems to be next to no information on this.

Some progress is apparent in nutrition monitoring. This allows the statistics presented in this report to be compiled. Granted these statistics prompt a host of questions, but they look as if they will produce some interesting and morale-boosting answers for those engaged in reducing malnutrition.

In an age where mobile phones are now commonplace even in remote rural areas, why are there not more systems that text in simple statistics such as the going rate for unskilled labour and the cost of a bag of the local staple food — data that should be readily apparent to informed locals?

Reacting to shocks

Finally, two perspectives emerge from the review of impacts. One is an approach to policy-making that monitors shocks and the distress that results and seeks to compensate vulnerable people who may lose out. This is the natural territory of social protection and of humanitarian action. Most thinking about the price spike has understandably been from this perspective.

But there is another view that emerges, one that comes from looking at change in the round and over a slightly longer period. The statistics being reported through this lens are startlingly different from those that come from detailed local surveys in the short run. To our great relief, it would seem that whatever the price spike did in the majority of countries, it has not condemned a generation of infants to malnutrition. Admitted that without a counterfactual we do not know to what degree progress has been slowed by higher prices, but what is evident is that only in a minority of cases has there been a regression. Corroboration comes from opinion polling, reminding us that for those fortunate enough to live in a thriving economy with reasonably broad-based growth and a government competent in providing public goods, services and some social protection, the price spike may have been unwelcome but was hardly a disaster.

What then is the priority for public action? Yes, vulnerable people need protection. But the wider goals of broad-based economic growth and accompanying improvements in public goods and services need to be emphasised, since the evidence suggests that where progress on these are made, the impacts of price shocks can be considerably buffered.

Those living in low income countries without strong growth and an able government need support to allow more resilience at household and community level — where most coping has taken place. This support will vary by circumstances, but potential foci for action include security; respect for rights of local people to land, water, grazing and forests; provision of key services such as health care; and providing passable road access.

1 Introduction

The spike in prices of cereals on world markets in 2007/08 shocked and surprised¹. For poor and vulnerable people it spelt hardship as the costs of cereals in many parts of the developing world rose unexpectedly. For national and international leaders, it was an unwelcome surprise given that for more than three decades previously, real food prices had fallen on world markets and on many national markets as well. The benefits of the green revolution, that had seen cereals supply outstrip demand even when the world population was growing faster than at any other moment in recorded history, had come to be taken for granted.

These events have prompted much discussion over what happened to bring about the price spike, what might happen to food prices in the near future, and what should be done — by the international community and nationally — in response. Much has been written, often close to the events, with imperfect information. It is now five years since the prices spike: with clearer information it should be possible to gain better insight into the event.

Aims of the paper

This paper aims to review what has been learned from the food price spike of 2007/08, what may be expected for prices in the future, and what the policy implications may be.

The report addresses three sets of questions:

1. What has been learned from the spike in cereals prices on world markets of 2007/08? What were the causes? How did governments and households respond? What were the impacts on the welfare of vulnerable people?
2. What will be the likely development of staple food prices over the next decade? What are the key factors that will affect them — and the main uncertainties?
3. In the light of these understandings, what are the policy implications, in actions to limit price rises and volatility and protect those vulnerable to high staple prices.

This review was not meant to revisit the questions in detail and set out all existing understandings: that would have been a much larger undertaking than was envisaged. Instead, it takes the understandings that were clear by 2009 — and of course the debates and controversies that were equally clear by then — as read; although the key findings and points of debate are briefly set out in this paper. Instead this study tries to identify what has changed in these appreciations in the meantime. For those who want more of the background, relevant ODI papers are listed in the References, but there are also other excellent reviews, of which the IFPRI monograph by Headey & Fan published in 2010 is highly recommended.

For those who want more of the background, a number of s, of which the IFPRI monograph by Headey & Fan published in 2010 is highly recommended.

Method

The report has been compiled by reviewing the literature, in particular that which has appeared since 2009. Overseas Development Institute produced a set of reports between 2008 and 2010 that looked at what was known about the price spike and its effects at that time: this report builds on those understandings. In addition, key informants were interviewed about the factors experts consider most likely to influence prices over the next ten years so, and the uncertainties that apply.

The three sets of questions outlined above provide a structure for the remainder of this report.

¹ See Figure 1 in section 2 which illustrates the price spikes in maize, rice, and wheat markets internationally.

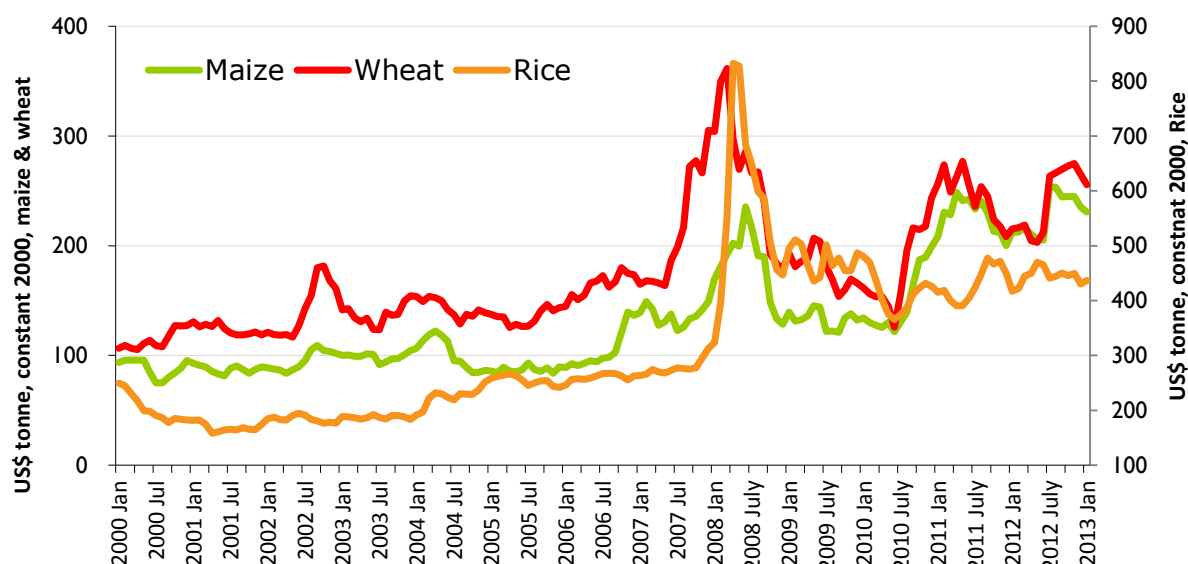
2 Looking back

2.1 Causes of the 2007/08 spike in prices of cereals on international markets²

The spike in the prices of the three main cereals in 2007/08 was the largest seen since 1973/74. Unforeseen by most observers, it was a rude shock after more than four decades in which the real prices of cereals had been falling for most of the time, with the important exception of the spike of 1973/74. By 2001, prices of maize, rice and wheat were just 25%, 20% and 31% in real terms, respectively, of their values in 1957. That was largely the result of the productivity gains in cereals that saw production for much of that period grow faster than population, during a period when the world population was growing faster than at any other time in recorded history.³

During the spike, maize prices rose in real terms by 139% for maize, by 125% for wheat and 209% for rice⁴, see Figure 1. So what led to the price spike of 2007/08?

Figure 1: Prices of maize, rice and wheat 2000 to 2012, constant US\$



Source: Compiled from IMF commodity statistics, deflating prices by the US GDP deflator

More than five years after the spike, a consensus prevails over the significance of poor harvests, low stocks, higher oil prices, diversion of maize to produce ethanol, export bans and other trade policies, and depreciation of the US dollar. While there are some arguments over the relative importance of these, the main bone of contention lies in the importance of index investment ('speculation') on futures markets for maize and wheat. Broadly speaking, the main difference of opinion lies between those who see the spike as

² Main sources for this section include: Abbott 2010, Abbot & Borot 2009, Abbot, Hurt & Tyner 2008, Collins 2008, Dawe & Timmer 2012, Dorward 2012, Gilbert 2008 & 2010, Headey 2010, Headey & Fan 2010, HLPE 2011, Irwin & Sanders 2010, Mitchell 2008, Robles, Torero & von Braun 2009, Timmer 2008, Trostle 2008a & 2008b, Wright & Cafiero 2010, and Wiggins et al., March 2010.

³ World population growth rates peaked in the early 1970s and have been falling ever since.

⁴ Measuring from the start of price acceleration to the peak seen: September 2006 to June 2008 for maize, May 2007 to March 2008 for wheat, and June 2007 to May 2008 for rice.

the result of factors such as supply, demand, currency values and trade policy that affect outcomes in markets that generally function competitively and efficiently; and those who see the spike as the result of failings within those markets, including manipulation of markets and behaviour of traders that reflects herd instincts and panic, rather than a rational assessment of the balance of supply and demand (Gérard et al. 2010). That is, a split between thinking of the spike as a result of factors exogenous or endogenous to the market.

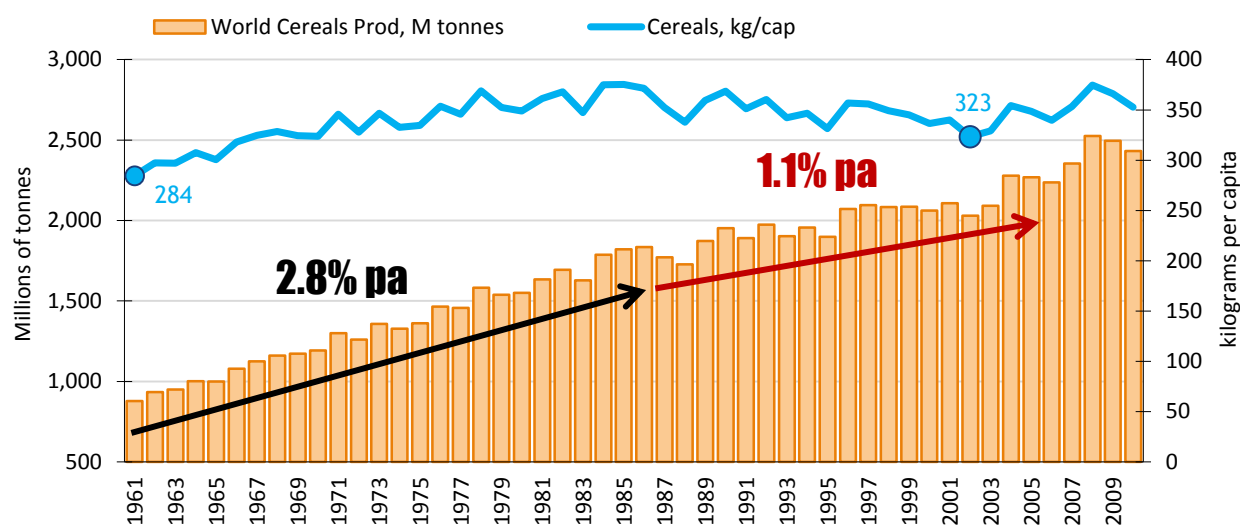
The way in which the different factors may have led to the price spike can perhaps best be set out by seeing their incidence through time, with different factors setting the context for the spike, triggering the acceleration in prices seen in 2006 and 2007, and then providing the positive feedback that turned higher prices into a sharp spike that in early 2008 overshoot dramatically the price likely in the medium term.

The build-up to the spike: 2000 to 2006

In Figure 1 the build-up in real prices that took place for the three main cereals after 2001 is easily obscured by the spike; but the increases were significant. Between January 2002 and August 2006, maize prices rose by 25%; between January 2002 and May 2007, wheat prices increased by 56%; while between May 2001 and June 2007, rice prices doubled, rising by 101%. The spike thus saw an acceleration of trends that had been underway for most the preceding five years. Three factors can be seen as driving up prices in this period.

The most important was a *slowing of the growth of production in cereals since the mid-1980s*. Between 1961 and 1986, world cereals production grew rapidly, at an annual average of 2.8%: faster than population growth so that production rose from 285 to 375 kg per person, see Figure 2. This remarkable achievement was largely the result of the 'green revolution' as farmers in favoured areas of the developing world, above all Asia, made use of higher-yielding varieties grown on irrigated fields with increased use of fertiliser and crop protection chemicals.

Figure 2: Growth of world cereals production, 1961 to 2010

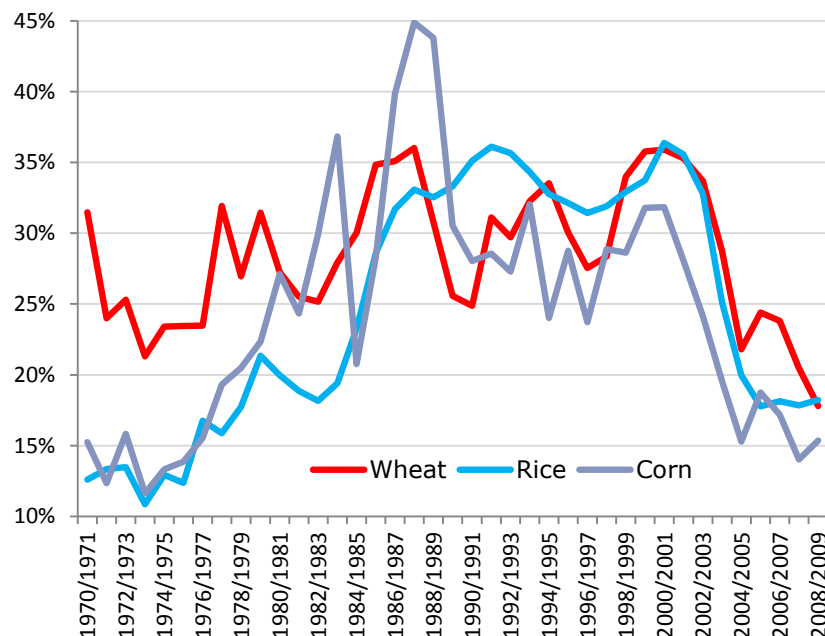


Source: Compiled from USDA data

After 1986, however, production slowed markedly over most of the next twenty years preceding the recent spike. Growth rates averaged barely 1.1% a year, falling slightly behind the growth of population which was itself slowing down. Consequently production fell back to 325 kg by 2002. This slowdown can be attributed primarily to low investment in agriculture, probably prompted by the sharp fall in prices on world markets that was seen after the spike of 1973/74 through to the early 1980s. Other contributory factors were policies in the US and Europe to decouple support to farmers from production, and the changes of regime seen in Eastern Europe and the old USSR that led to considerable falls in grain output in these regions. Donors, including DFID, also pulled aid out of agriculture, affecting Africa particularly badly (Eicher 2003).

As production fell behind population growth, *stocks were run down*; a process that was exacerbated by decisions to hold smaller public stocks in the USA, European Union and China. Stocks that had been built up after the spike of 1973/74 grew until the mid-1980s, after which they were whittled away. For the three main grains, worldwide, end-of-season stocks as a ratio of use fell from more than 34% in the late 1990s to under 20% by 2005 — see Figure 3.

Figure 3: Stock-to-use ratios for cereals, since 1970/71



Source: USDA data. . Vertical axis shows end of season stocks as percentage of annual consumption.

The role of stocks is debated. On the one hand, most spikes in cereals prices seen over the last half century took place when stock-to-use ratios were low (Wright & Cafiero 2010; Bobenreith et al. 2012); there have never been spikes when stock ratios have been above the broad thresholds considered adequate.⁵ Others object that low stocks are a result of the outcome of production and consumption that are more fundamental determinants of prices and therefore do not cause price spikes (Headey & Fan 2010). This is an odd argument. Stocks are not just a residual: stocks may be kept deliberately by public agencies and traders. While it may be true that low stocks of themselves do not cause prices to rise, when they are low any sudden fall in supply or rise in demand cannot be accommodated by release of stocks and hence adjustment falls largely on prices. For policy-makers and traders, stock-to-use ratios are perhaps the single strongest indicator of propensity to prices spiking. Of course, prices will not necessarily spike every time stocks run low: if harvests are adequate and demand fairly stable, low stocks may be sufficient. But when there are shocks — and harvest failures occur frequently if neither regularly nor predictably — and stocks are low, then price spikes are very likely (Wiggins & Keats, Jan 2010).

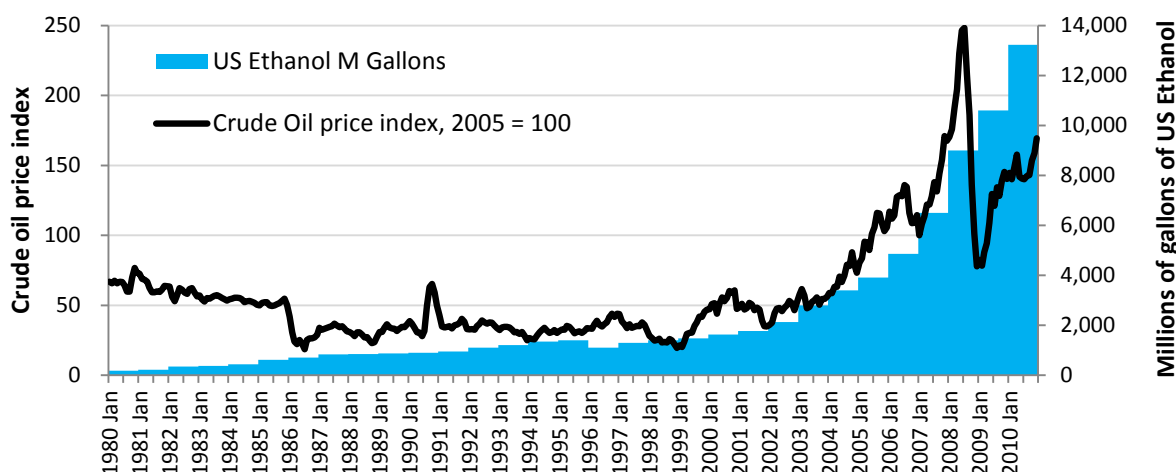
Oil prices rose in the 2000s, from less than US\$20 a barrel in late 2001 to more than US\$130 a barrel in July 2008, raising costs of diesel and nitrogenous fertiliser, and hence costs of production on farms as well as of transport of cereals. The effect of this on prices has to be seen in conjunction with rising demand for grains. If costs of production rise, and nothing else changes, then prices will rise, production will be reduced, and farm incomes will fall. Wright & Cafiero (2010) point out that during the price spike production was increasing and

⁵ Precise thresholds for stocks adequate to withstand supply variations are not known, but the conventional wisdom is that ratios of under 20% for wheat and perhaps as low as 12% for maize, are associated with strong price increases if harvests are poor. (http://futures.tradingcharts.com/learning/stocks_to_use.html)

US farmers' incomes, and land values, soared. The main driver can thus be seen as high demand for output, rather than higher costs of production that were being outstripped by the rising output prices.

Hence those authors stress the importance of higher oil prices in raising the *demand for maize to distil to ethanol*. Prices of crude oil and ethanol production in the United States moved closely in step in the run-up to the prices spike, see Figure 4. Before 2000 there was little relation in oil prices to ethanol production. But from 2002 through to the height of the spike in early 2008, ethanol production grew closely in step with the oil price.

Figure 4: US ethanol production and crude oil price index



Sources: RFA for annual US production of ethanol; Crude oil prices are indexed to 2005 = 100, simple average of three spot prices; Dated Brent, West Texas Intermediate, and the Dubai Fateh, from IMF Commodity prices.

Some debate arises over the relative importance of oil prices compared to public policies, combinations of production quotas ('mandates') and subsidies, to encourage the replacement of fossil fuels by renewables such as biofuel in both the US and the EU. Policy probably acted as a catalyst to the start-up of ethanol distilling, while increasing mandates gave firms confidence to invest in distilleries. On the other hand, it is hard to imagine that policy alone led to US ethanol production increasing by more than four times between 2002 and 2008. Modelling suggests the importance of prices: Hertel et al. (2008) deduce from using the GTAP model that most of the increase in production came from the rising oil price, as well as the effective outlawing of MTBE as a gasoline additive (see below).

While some of the maize distilled in the US came from additional production, some was diverted from previous use as food and feed. Moreover, additional land used to produce maize tended to displace wheat and soybean production, thereby reducing their supply. The overall effect was thus to push up prices of maize, wheat and soybeans. This effect would have been stronger, were it not for ethanol distillation producing as a by-product dried distillers' grains with solubles (DDGS) that can be used to substitute for animal feed, thereby offsetting the loss of maize available to fatten livestock.

Other macro-economic factors contributed to rising cereals prices in the years leading up to the price spike. Between 2002 and 2007, the *US dollar fell in value* against other major trading currencies, from US\$1.25 to US\$ 1.50 per SDR. Some importers, particularly in Asia and the Middle East found they could afford to bid more for cereals in dollar prices and hence tended to push up prices.

In general, *rapid economic growth* in the world economy with commensurate increases in demand for most commodities, accompanied by expansion of the money supply, permitted general inflation across commodities. The metals price index, for example, more than trebled between late 2001 and mid-2007, while the food price index rose by 87%.

Increasing incomes across the world, but especially in emerging and urbanising economies, may be leading to *increasingly inelastic demand for food with respect to price* (HLPE 2011). As more and more households

barely change their consumption, especially of staples, as prices rise, then prices will tend to rise more sharply than before when temporarily limited supply has to be rationed.

Two other factors need to be mentioned as well, whether or not they influenced prices in the lead up to the price spike. One is *investment by index funds in agricultural futures markets* in the USA apparently prompted by low yields to investments in equities and gilts. Very large amounts were invested in funds that tracked bundles of commodities including agricultural futures in maize, soybean and wheat. For example, the quantity of maize futures held by index funds on 12 March 2008 was 60.4M tonnes, up from 6.1M tonnes just over five years before on 01 January 2003; while the quantity in wheat futures increased from 4.5M to 30.9M tonnes. Unlike traditional speculation on futures markets that provides liquidity for those seeking to hedge their prices on the exchanges, these investments were in 'long' positions, with the expectation of medium to long term rises in the value of commodities. How important they were in driving up prices is however, the single most controversial issue, as will be explained shortly.

Increased demand for cereals in booming Asian economies is the other factor sometimes mentioned. Yet while their consumption of grains rose in the 2000s, growth was modest and steady. Cereals consumption in China and India, for example, grew quite slowly: from 1990/91 to 2007/08, by 25% in China and by 40% in India, that is, at average growth rates of 1.1% and 1.6% a year, and with little sign of any acceleration during this period.⁶ Moreover, both countries import very little grain:⁷ their demand is met very largely by domestic production, backed up by high levels of public stocks to ensure that should domestic harvests fail they do not have to buy in heavily on a world market that would find it hard to accommodate the large amounts that either of these countries might require to cover a poor harvest. Hence this factor can be set aside as contributing to the price spike.

Short-term triggers, 2007 and 2008

The above factors explain the relatively modest, but significant, rises seen in cereals prices from 2002 onwards. Price increases then accelerated in 2007 and early 2008 as shocks hit the markets, triggering sharp increases in prices.

On the supply side, there were *low harvests for wheat* in Australia and Ukraine in 2006 and 2007 so that world production fell from 626Mt in 2004/05 to 621Mt in 2005/06 and to 596Mt in 2006/07: about a 4% decrease over the two years. The *EU maize harvests* for 2006/07 and 2007/08 were also low: down by 12% and 22% respectively on 2005/06. Overall, world grain production fell slightly for the two years after 2004/05.

US biofuel policy was probably another trigger. The 2005 Energy Bill set mandatory targets for biofuels production and discouraged use of MTBE (methyl tert-butyl ether) as a petroleum additive that led to its replacement by ethanol. Combined with the high oil prices, this boosted ethanol production so that by 2007 more than 30% of the maize crop in the US was distilled.

Reactions to rising prices lead to positive feedback, late 2007 and early 2008

Even with these triggers, price rises might not have spiked as sharply as they did, were it not for changed behaviour of countries, traders and consumers who took fright as cereals prices climbed in 2007. Their actions exacerbated the price increases.

An important and frequent reaction to rising world cereals prices by governments was either to facilitate imports for countries that were net importers, or to limit exports for those countries that were net exporters. Net food importers typically *reduced any import tariffs* they had on cereals to allow consumers to maintain consumption in the face of rising prices that might otherwise have discouraged consumption or caused them to switch to some other staple food.

⁶ In the five year period 2002/03 to 2007/08, China's consumption of grains rose by 5% and India's by 9%.

⁷ Even when including the indirect grain imports when countries such as China import meat that has been produced largely by feeding grain to pigs and poultry.

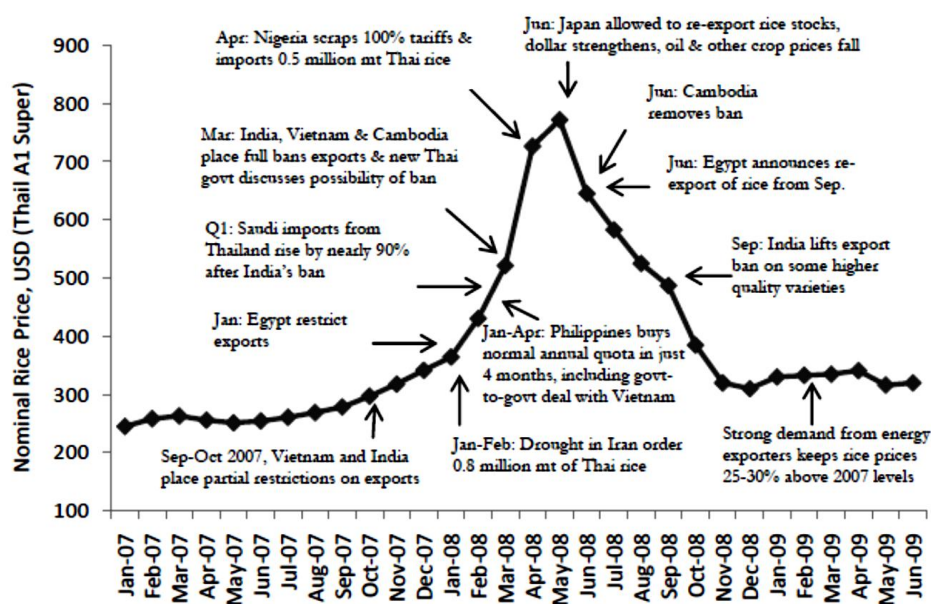
This was not all that happened in such countries. Some were so alarmed by the unexpected and rapid increase in prices that they feared that stocks would be eliminated and they might face absolute shortages. Hence some countries ordered more imports than normal, in effect *restocking in the face of a tight market*.

This applied above all to rice. For example, in marketing year 2007/08, compared to average imports for the five years from 2001/02 to 2005/06, the Philippines imported 71% more, Malaysia 54% more, Iran 36% more, the EU 31% more and Saudi Arabia 15% more. Bangladesh increased imports by 134% over the five-year average, but that was largely in response to a domestic harvest failure.

On the exporting side, *export bans or restrictions* were applied to wheat and most damagingly to rice. For wheat, Kazakhstan banned exports from April 2007 until mid-2008; Ukraine imposed quotas on exports in July 2007 before relaxing them in October 2007, and removing them in May 2008; Russia imposed taxes on wheat in November 2007, raised them in March 2008 before withdrawing them in July 2008; and, Argentina also restricted its wheat exports. Wheat prices may have risen by 20% in response to export restrictions, according to USDA calculations (The Economist, 27 March 2008).

For rice, India banned exports of non-basmati rice in November 2007, Vietnam limited its exports in September 2007 and by early 2008 Egypt also stopped exports. These moves caused panic in the rice market and led to the heavy restocking. Figure 5 shows the timing of these events and suggests how important they were in the rice markets, where the price spike was so much more pronounced than for maize and wheat.

Figure 5: Trade and the rice price, 2007 to 2009



Source: Figure 2 from Headey 2010, based author's compilation of press articles and USDA Foreign Agricultural Service reports.

India's export restrictions had an especially strong impact. Headey (2010) attributes this ban to a low Indian wheat harvest in 2006/07 that depleted stocks and led to the import of 6Mt of wheat. This alarmed the government, sufficient to ban rice exports.

Rice markets were affected by wheat markets: as wheat prices rose in the first half of 2007, the main rice importing countries that also import wheat, reduced wheat imports in favour of rice, thereby transmitting the effect of low wheat harvests to the rice market. Indeed, Headey (2010) confirms by Granger causality tests, that the two sets of prices were linked at the time.

Others also stress the importance of the trade measures taken by governments to insulate their economies from rising world prices. Reporting their analysis, Martin & Anderson (2011) comment:

... estimates suggest that in 2005-08 more than a third of the observed change in the international price of rice, and roughly one-quarter of the observed change in the international price of wheat, can be explained by the changes in trade policy that countries used in an attempt to insulate themselves from the initial increases in prices of these staple commodities resulting from underlying shocks such as those resulting from factors such as biofuels, income growth, drought and speculation that have been the focus of other work on the recent price surge. In 2008 alone, the change in protection on rice explains close to forty percent of the 90 percent increase in rice prices observed for that year. [Martin & Anderson 2011]

It was not just governments that took fright. There may well have been additional *stocking by consumers and traders of rice*, worried either that prices would be higher still in the future or that high prices heralded imminent shortages. In the Philippines, for example, the press reported extra buying in supermarkets. Timmer (2008) estimates what would have been the effect on the world price of rice if all Asian consumers had reacted to concern over rising rice prices by stocking an extra one week's worth of rice at home: this equates to an additional 7M tonnes of rice demanded in the very short run, roughly one quarter of annual trading in rice on world markets. This, he calculates assuming highly inelastic supply in the very short term, would have been enough to explain most of the observed increase in rice prices.

Discussion: speculation and longer-term changes

Index trading on agricultural futures markets

The effect of investment by index funds in cereals futures — usually described as 'speculation' — has attracted much attention. As the volume of index investment rose, by ten times for maize and seven times for wheat between March 2003 and March 2008, futures prices for maize and wheat rose by 134% and 314% respectively, and spot market prices by 223% and 310%. It has thus been possible for some to argue that this investment, the product of liberalisation of trading, contributed substantially to the price spike.

In the debates that have ensued at least three positions can be seen: one argues that speculation was a major cause of the spike (von Braun & Torero 2008, Robles et al. 2009, Worthy 2011); another that it was not (Irwin & Sanders 2010 for one of the most comprehensive treatments); and a third position is more agnostic (Headey & Fan 2010), but then sometimes invokes the precautionary principle to recommend that index trading be restricted (HLPE 2011).

Those who see index investment as a major cause tend to cite the sheer volume of investment entering the futures market — 'a wall of money'; as well as the apparently improbable size of the price increases over a few months, periods in which neither supply nor demand changed by anything more than a few percentage points.

These sharp spikes are historically unprecedented even in the volatile price history of primary commodities (World Bank 2009). Such wild swings in prices obviously cannot be explained by short-term supply and demand factors or any other 'real economy' tendencies. Instead, these acute price movements are clearly the result of speculative activity in these markets. [Ghosh 2010]

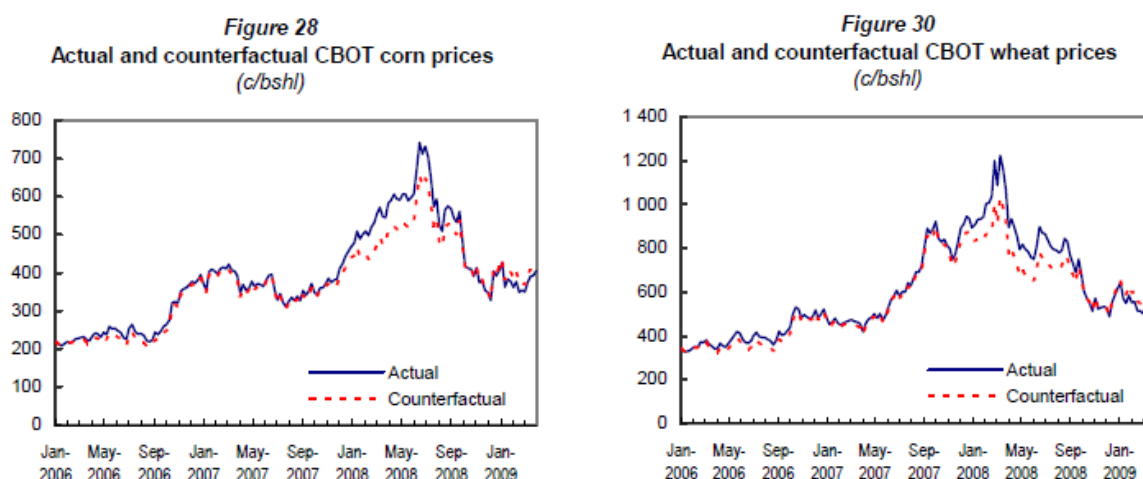
This, however, ignores what can happen to prices when supply (when stocks are low) and demand are highly inelastic in the short run: small reductions in supply or increases in demand can lead to very large changes in prices.⁸

Evidence for causal relations between index investment and rising cereals prices is thin, partly because it is hard to test the proposition. The most commonly applied test has been that of Granger causality, where

⁸ Prices in markets are those of trades at the margin. When the world price of rice in early 2008 touched US\$1,000 a tonne, just how much was being traded at this price, and who was buying? Not much was being traded, little was on offer, so those desperate for rice at the time were prepared to bid high for the little available. Most of the buyers were probably representing clients, such as supermarkets in Europe, for whom price was not an obstacle; but for whom being out of stock of rice was the more significant danger.

reports show little or no effect (Gilbert 2008, Irwin & Sanders 2010, Robles et al. 2009, Sanders et al. 2008). In a later paper, however, Gilbert (2010) does find a significant effect from index investment to futures prices for maize and wheat. But the size and timing of these effects matters. He finds that the effect of index investment increased futures prices by 18% for wheat, 16% for maize, and 15% for soybeans. Using the parameter estimates, it is possible then to produce a counterfactual of what futures prices would have been for these commodities without index investment. Here are the results for maize and wheat.

Figure 6: Effect of index investment on futures prices for maize and wheat during the 2007/08 price spike



Source: Gilbert 2010

Two things are clear. One is that periods over which index investment raises prices are limited: for both maize and wheat significant influences can only be seen from January to September 2008, despite index investment levels having been high over much longer periods. The other and more striking result is that size of effect is (very) small compared to the price increases seen during the spike. From early 2006 to the peak of the spikes seen in futures prices, in both series the increase is more than three times: yet index trading has apparently contributed at the peak of the spike just 16% and 18% to these increases.

A more recent study using more detailed daily data of index trading on a dozen agricultural futures markets in the US (Auerlich et al. 2012) finds even less effect (paragraphing added):

Bivariate Granger causality tests use [commodity index trader] CIT positions in terms of both the change in aggregate new net flows into index investments and the rolling of existing index positions from one contract to another. The null hypothesis of no impact of aggregate CIT positions on daily returns is rejected in only 3 of the 12 markets. Point estimates of the cumulative impact of one standard deviation changes in CIT positions on daily returns are very small, ranging from -0.127% to 0.034% and average only -0.022%.

The null hypothesis that CIT positions do not impact daily returns in a data-defined roll period is rejected in 5 of the 12 markets and estimated cumulative impacts are negative in all 12 markets; the opposite of the expected outcome if CIT rolling activity simultaneously pressures nearby prices downward and first deferred prices upward.

So not only does such index trading only affect prices in a minority of markets, the effects are small, and for rolling activity may even be negative — that is, index trading stabilises prices rather than makes them more volatile.

These findings support the logical arguments against the index trading being significant (see Irwin & Sanders 2010) that include:

- Much of the increase in index positions on futures came before the price spike. Indeed, between the first quarters of 2006 and 2008, increases in long positions taken by (commercial) hedgers on maize futures considerably exceeded those of index fund moves (Irwin 2008);
- Not all agricultural commodities into which index funds have invested have seen large increases in prices — much index investment went to livestock where price rises were much less. On the other hand some farm products for which there is little or no futures market did see price spikes, above all rice. There is barely a futures market for rice, and yet the price spike for rice was by far the largest; and,
- What is the link from futures to spot market prices? If futures prices were to affect spot prices, it would be through traders reacting to the futures prices by buying up physical produce from the markets and storing ('hoarding') this in anticipation of making high profits later. No evidence of this can be found: index funds neither operate nor rent grain silos.

Irwin & Sanders (2010) wonder whether some observers understand the futures markets: if there are massive increased long positions taken by index traders, then there have to be others who take equally large short positions. Neither demand nor supply of the commodity thus changes.

Longer-term changes

Although the argument presented here sees the price spike as an unusual event that resulted from the coming together of many factors, there are perspectives that set this within the context of longer-term changes. The High Level Panel of Experts (HLPE) appointed by the Committee for Food Security (CFS) interprets the spike at three levels, one of which is the 'perfect storm' illustrated here. But that can be seen within cycles of investment in agriculture that affect the growth rate of cereals production, with the spike coming after a prolonged phase of low investment in agriculture worldwide that began in the early 1980s, following a decade or more of heavy investment in agriculture that followed the shock of the 1973/74 price spike.

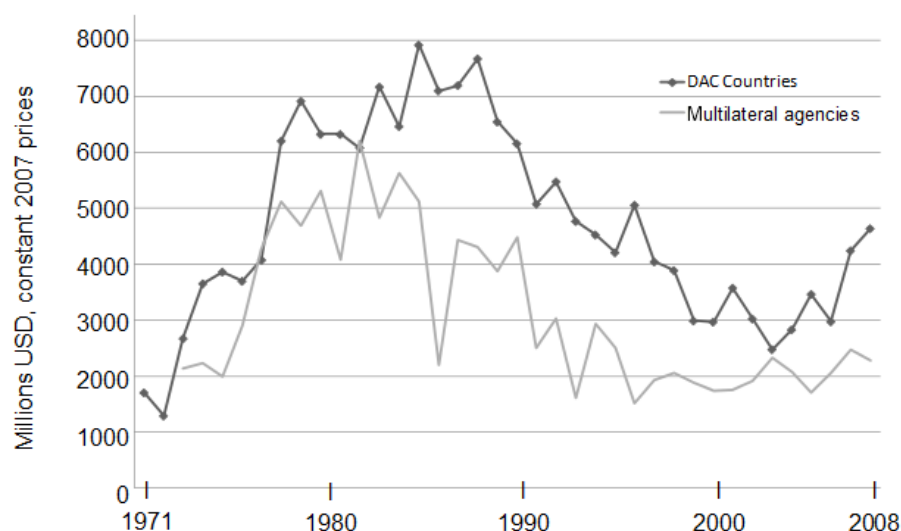
From the end of the 1970s to the mid-1990s, the growth of world Agricultural Capital Stocks (ACS) slowed, ultimately stabilizing at a low growth level. Several developed regions even experienced a process of decapitalization in agriculture. In developing regions, the growth of ACS stayed positive, but slowed and is still slowing in Latin America, sub-Saharan Africa, and south Asian countries. The slowing of agricultural investment growth occurred during a period of restricted public support for agriculture in developing countries.

Calculated as a percentage of agricultural Gross Domestic Product (GDP), public spending decreased from 11 percent in 1980 to 8 percent in 1990 before returning to 10 percent in 2002. This is much lower than in developed countries, where the share of public support to agriculture is often more than 20 percent of agricultural GDP. This general slowing of government expenditure adversely affected agricultural research.

Nor did financial aid to developing countries from OECD countries and multilateral agencies counter this trend. Indeed, ODA certainly contributed to the trend away from public investment in agriculture in the poorest countries. [HLPE 2011, with paragraphing]

Aid for agriculture has indeed followed pronounced cycles over the last forty years, see Figure 7.

Figure 7: Overseas Development Aid to agriculture, DAC countries and multilateral agencies, 1971–2008



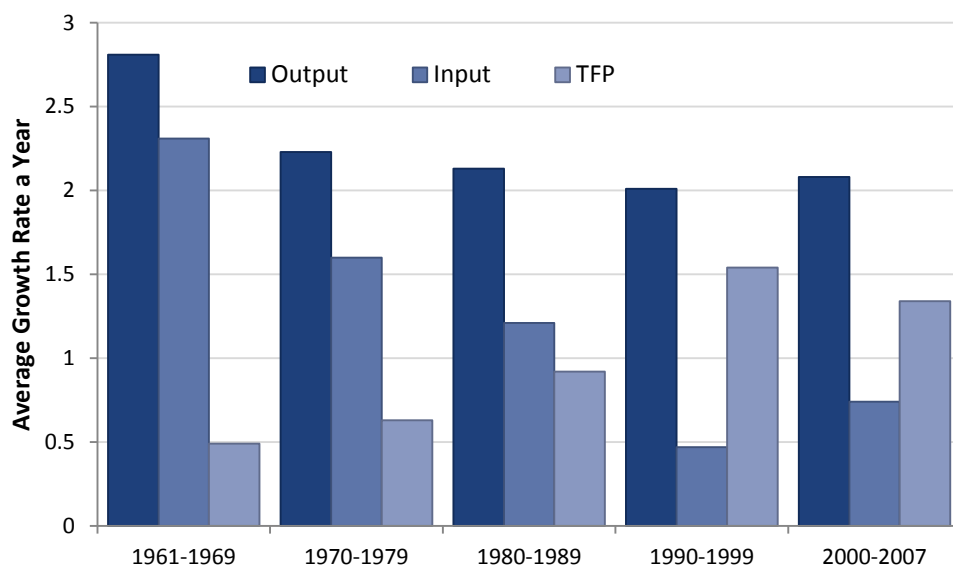
Source: HLPE 2011, Figure 6, compiled from OECD data

Agricultural prices may drive these cycles. Food price spikes cause anxious leaders to prioritise public spending on agricultural investment, while stimulating farmers to invest and innovate. Once renewed investments are made, supply tends to increase ahead of demand so that prices fall in real terms, steadily discouraging farmers while reassuring political leaders that agriculture is not a priority. As growth rates slow and fall behind demand, stocks fall, leaving the system vulnerable to shocks so that comparatively minor perturbations to the market end up in sharp price spikes; at which point the cycle is renewed. (See also Dorward 2012, who cites Piesse & Thirtle 2009 and Timmer 2010 as also identifying these cycles.)

These cycles, however, do not have a constant mean level of food prices: the long-term trend is reassuringly downwards, a movement that can be explained by rising productivity in world agriculture (Fuglie 2010). Since 1961 the growth rate of agriculture has slowed a little with each decade: although still exceeding the growth of population. More remarkable has been the much greater slowing in the rate of addition of inputs used on farms, so that productivity of inputs has been increasing almost every decade: from improvements that averaged 0.5% a year in the 1960s, to 1.3% a year in the 2000s.

The political and economic cycles described may not be ideal, but they are not preventing long-term advances in farm productivity that promise falling unit costs of food. Increased productivity can be attributed to the application of technology derived from scientific research, plus improved management by farmers.

Figure 8: Trends in agricultural output, input use and total factor productivity (TFP), by decade since 1961

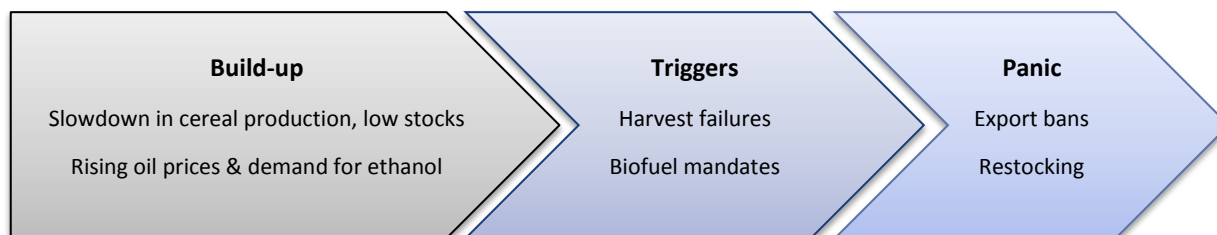


Source: Fuglie 2011, Table 4.6, compiled using FAOSTAT data with the author's adjustments and calculations.

HLPE (2011) have an even wider landscape in which to set changes, as the panel wonders whether the spike marks a transition from times when it was possible to boost agricultural output by use of cheap energy from fossil fuels, while setting aside environmental costs such as conversion of forests, overdraw of groundwater and pollution of water and soils, to times when energy will be more costly and agriculture has to be environmentally sustainable — changes that could see the costs of production rise on both counts. If this were true, then this might mean that the trends of rising productivity seen in Figure 8 might be brought to a halt.

Summary and discussion on causes of the price spike

Five years after the price spike, the many analyses and discussions of the causes have tended to reveal additional insights into factors not always immediately apparent so that understandings today are generally of a spike that had many causes from factors operating on different time scales, that came together in a remarkable conjunction. The argument here distinguishes the *conditions that made possible the spike* — mainly a slowdown in the growth of cereals production, stocks depleted to a level at which short-term shocks could not be accommodated, rising oil prices and the associated extraordinary increase in the demand for US maize to be distilled to ethanol; from the *short term triggers* of harvest failures and biofuel mandates that accelerated price increases; and from the *very short term, panic reactions* of governments, traders and consumers whose restocking, export limitations and hoarding aggravated the initial price increases to produce an extraordinary spike.



Some debate continues about the relative importance of the different factors, but it is hard not to agree with those who argue (for example, Abbott et al. 2008) that if the spike resulted from multiple events coinciding in time, then it is difficult to weight the contributions of different events: remove one factor, and it is probable or possible that the spike would never have occurred at all. That does not mean, however, that a single factor thus accounts for all or most of the spike.

Most of the causes are reasonably well understood and agreed: with the prominent exception of the role of index investment on futures markets for maize and wheat. No matter the profusion of papers addressing this issue, the arguments continue. To some extent this reflects the difficulties of proving the argument one way or the other; but increasingly it seems that fundamental differences in perspectives make it hard for some to accept contrary evidence — and those on different sides of the argument tend to cite different literatures using different standards of evidence.

Interpretations of unusual, unexpected and unwelcome outcomes in markets remind us that markets will always be less than perfect: but does that mean that they need reform or replacement? In price spikes, some see the imperfections of markets as greater than their benefits, imperfections that thus demand remedy. Others see these events as brief crises within systems that generally work well: systems that are sufficiently complex that they defy simple correction, and where unwise intervention may lead to worse outcomes.

2.2 Price transmission: relating international price rises to local prices

Changes in world prices for cereals should transmit to domestic markets, with a short time lag for the transport of physical supplies. This applies as much to countries that export cereals as those that import them.

The degree of transmission, however, can be highly variable owing to: border measures such as tariffs and quotas on imports, or taxes and quotas on exports; domestic market interventions such as price controls, subsidies, operation of public stocks to buffer price variations; changes in exchange rates of domestic currency against international trading currencies; imperfections in markets that allow traders or state agencies to influence prices; and transport costs from ports to the main centres of consumption — when these are high changes in international prices will produce less movement in domestic markets for imported food but greater changes for exported food.

Of these factors, middle income countries generally have the greatest ability to affect domestic prices through policy, while most low income countries lack the funds and capacity to do so. For countries that are landlocked or where the main consumption areas are distant from ports, as applies in parts of Africa and central Asia, high transport costs to ports can provide considerable insulation from international price movements.

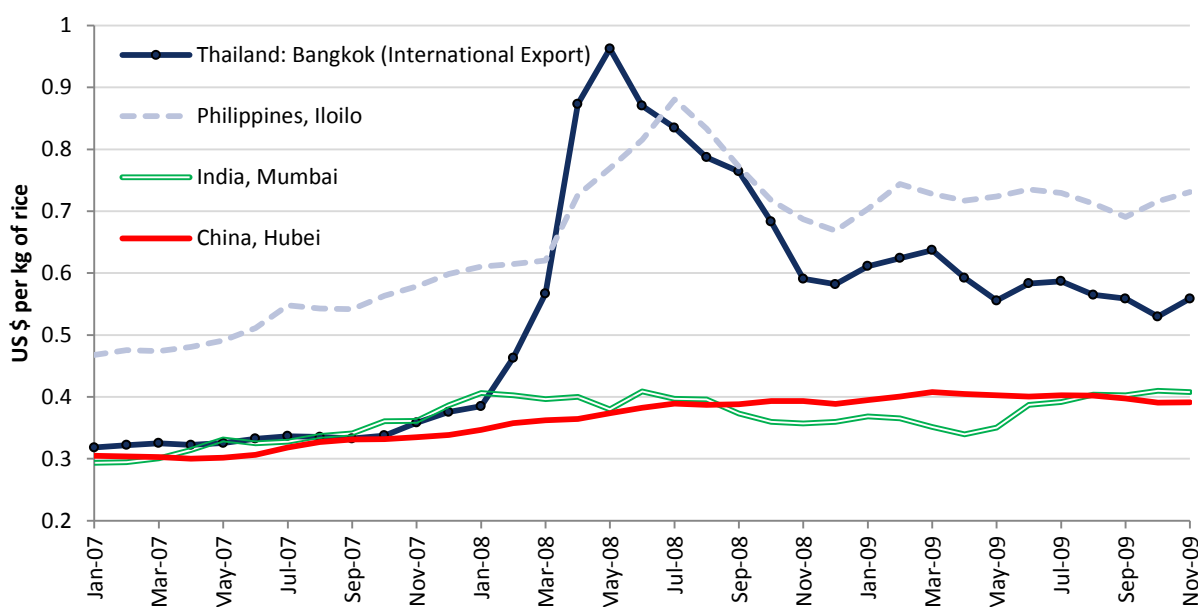
Patterns of price transmission

The 2007/08 food price spike produced several clear patterns.

A very few countries saw small increases in cereals prices in domestic markets, with increases of 30% or less. This select group included the largest countries in Asia: China, India — see Figure 9 — and Indonesia. These countries were able to insulate their domestic markets from international turbulence by restricting trade with the world market, and using public stocks to stabilise domestic prices⁹. Such measures can be costly, but these are countries that are so large that were they to have to import to compensate for a shortfall in a domestic harvest, they would risk driving the world price up to high levels.

⁹ Young (2011) notes that at the start of the 2007/08 price spike, Indonesia was lucky to have had record rice harvests allowing a surplus of some 1M tonnes; this compares favourably to their position of the world's largest rice importer at the time of the Asian Financial Crisis, believed to have had far more serious impact on food security for the country.

Figure 9: Price transmission for rice in Asia



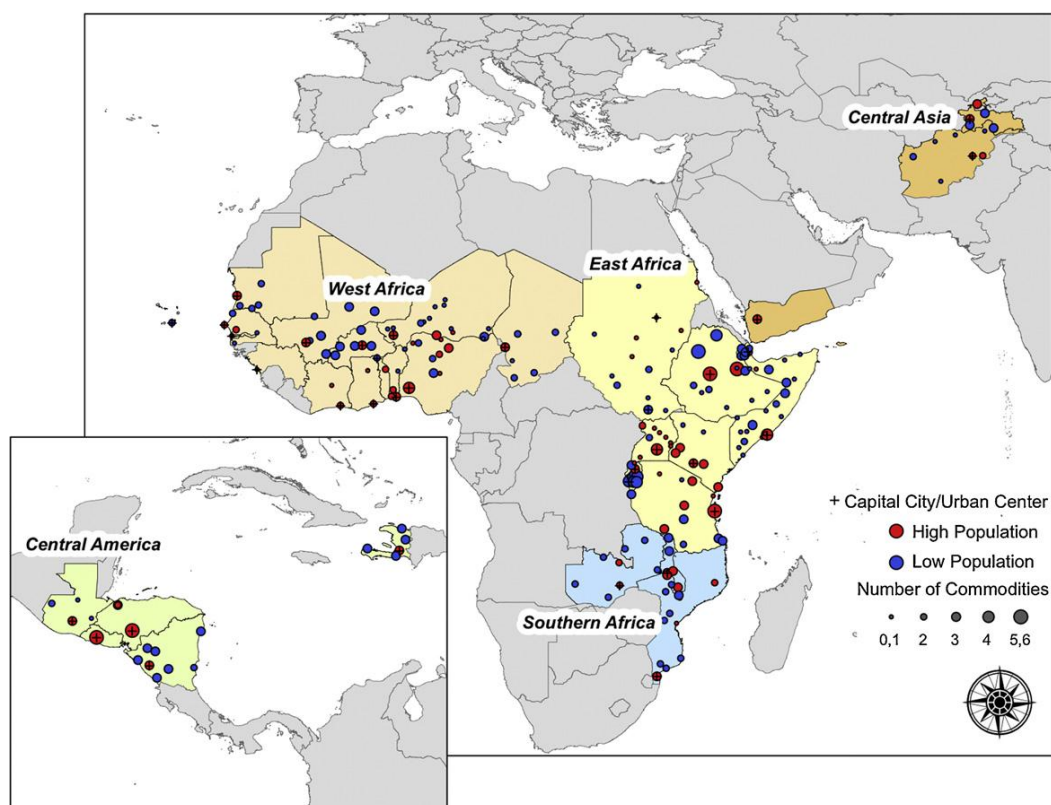
Source: GIEWS database of domestic prices for staples

Most countries saw domestic cereals prices rise by 40–70% of the rises seen for international prices. Some buffering took place, but most of the increases were reflected in local prices — see the example of the Philippines rice price in Figure 9. These increases tended to be stronger for countries with consumption centres close to the coasts and where staple food consumption was dominated by one of the main traded cereals.

Conversely, countries with centres of consumption distant from ports, where a variety of staples are consumed, and where staples were the little-traded roots and tubers, or grains such as millet and sorghum, saw least transmission. Many low income countries and those subject to food crises belong to this category, see Figure 10. Tests of the relation of their domestic prices of staples to international prices tended to show little correspondence (Brown et al. 2010). For all countries, local factors such as domestic harvests, or regional restrictions on trade with neighbouring countries, were as influential as international movements: this applied strongly for the countries insulated from international price movements by transport costs and consumption of little-traded staples. Insulation from world markets was not always an advantage.

For example, in Ethiopia food prices rose by 95% between 2006 and 2008, as annual food inflation increased from 14% to 85%: food prices were already rising before international prices accelerated under pressures of domestic inflation (Ticci 2011). Similarly in Malawi, in late 2008 and early 2009, after the international price spike, domestic prices of maize more than doubled in an amplification of the seasonal cycles (Wood et al. 2012).

Figure 10: Countries with high levels of food insecurity and recurring food crises



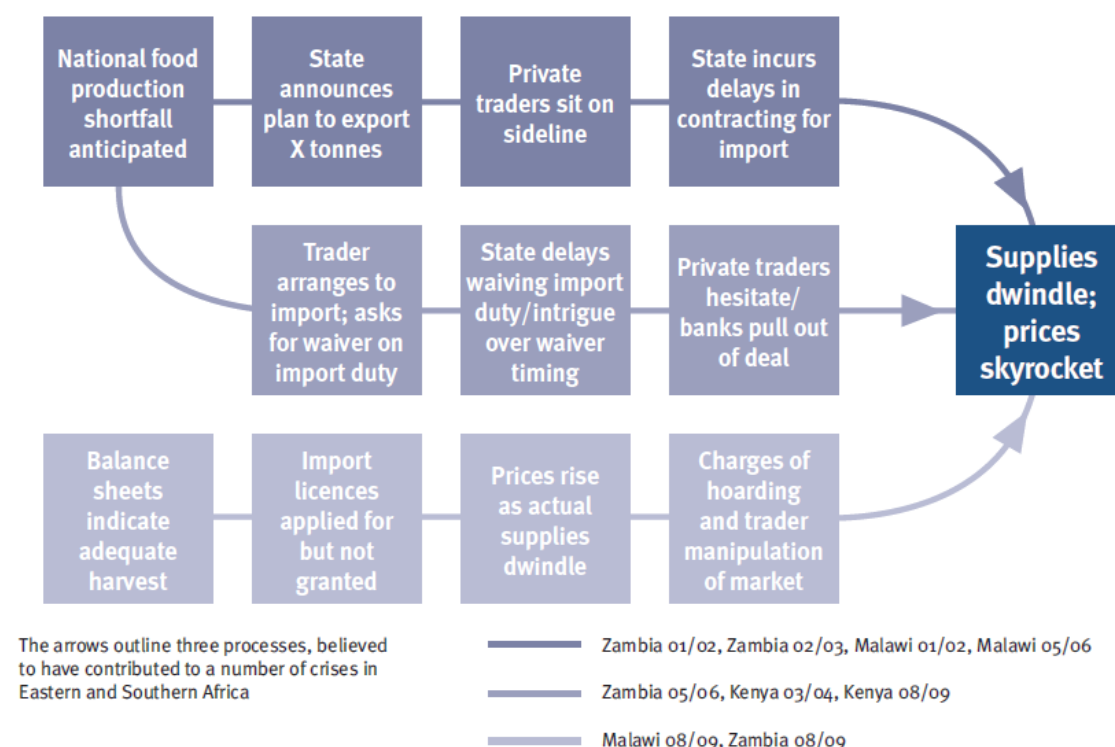
Source: Brown et al. 2012. These are the countries on which the US Food Early Warning System (FEWS) focuses

Indeed, across Africa significant price rises have been seen since 2006:

Across 83 food prices in eleven countries examined in this report, the average increase between June 2007 and June 2008 was 63% in US dollar terms. On average, this represents 71% of the increase in the price on international markets for the corresponding commodities. [Minot 2010]

Yet despite domestic prices rising at the same time as world prices, econometric analyses of domestic prices to international prices show generally little correspondence, with the salient exception of rice, most of which is imported in many African countries. Minot (2011) believes the most likely explanation lies in a combination of simultaneous increases in oil costs and hence transport costs, bringing inflation to Africa. Similarly, some countries banned or tried to ban exports of grain, thereby tending to push up prices in neighbouring countries. Failure to coordinate imports between public and private actors has been credited with sparking a number of food crises in Eastern and Southern Africa since the turn of the century (including Malawi in 2008/09), see Figure 11

Figure 11: Public/private coordination failure in cereal importation



Source: Keats et al., 2010, adapted from Jayne & Tschirley 2009a,b

In summary, then, three broad patterns of transmission can be identified. Very large Asian countries, such as China and India, were insulated from world markets by large (and costly) public stocks and restrictions on trade. Other developing countries with reasonable access to world markets saw a significant if muted transmission to their markets, so that domestic prices of staples rose considerably, with rises in the range 30% to 70%. A third group of countries, mainly low income especially in Africa were insulated from world markets by high transport costs; and in some cases additionally by the importance of little-traded staples such as cassava, yams, millet and sorghum in local diets. Food prices in these countries depended far more on domestic harvests, as well as on restrictions to trading regionally with neighbouring countries, than on world prices. In some parts of inland Africa, for example Ethiopia and Malawi, food prices rose at the same time as the spike on world markets, but domestic inflation and harvest losses were probably the causes, not the international price spike.

2.3 Public responses to the price spike

With rare exceptions, mainly the large countries of Asia, most developing countries saw their domestic prices of staple food rise — even if in Africa those price increases owed more to failing domestic harvests, local inflation, or the effects of rising fuel prices on transport costs than to the spike on world markets. Not surprisingly, then, most developing country governments took measures to mitigate the price rises or their effects. Their reactions can be grouped into three sets by objective:

- to mitigate food price rises either by reducing transmission across the border from the world market, or by containing price rises within the domestic market;
- to compensate and protect vulnerable groups against price increases through additional opportunities to earn and by transfers of food and cash; and,

- to increase domestic food harvests and bring down prices through increased supply.

An earlier review (Wiggins et al. July 2010) reported that two-thirds of developing countries took measures in all of these areas. Subsequent reviews of these experiences confirm and reinforce the patterns that were emerging at that time.

Moderating prices at the border or on domestic markets

Low income countries (LIC) generally found it difficult to control prices. At the border, to reduce price transmission they frequently reduced tariffs on imported staples. Many, however, had liberalised their tariffs: for Sub-Saharan Africa tariffs were only around 10% (de Janvry & Sadoulet 2010). Removing the tariffs thus made in most cases only a small dent in the price increases of imported grains. Export restrictions were commonly applied for those countries that were net exporters of cereals: although this did not apply to that many cases.

Domestically, controlling prices by fiat was very difficult, faced by diverse and dispersed food markets with little capacity to enforce any controls. Subsidies on prices were out of the question on account of the costs. Releasing stocks might have worked, but few LIC had public stocks of the size needed to depress local prices.

In West Africa, in Burkina Faso, Mali, Niger and Senegal, FAO (2011) reported limited success in moderating price rises, owing to lack of capacity in functioning public agencies and experience that could implement policies. Bans on cereals exports were difficult to enforce in a region where borders are long and porous. Attempts to distribute food at controlled prices saw the practical problem in border regions of having to escort lorries to prevent diversion across the frontier, thereby raising the cost of operations. The few stocks that could be released were too small to depress prices.

Not only were the measures generally ineffective, but also they may have exacerbated the higher prices by distorting existing marketing. At the same time, the costs of removing taxes and tariffs led to lower government revenues, higher government deficits that had to be covered by the West African Economic and Monetary Union. (FAO 2011)

In Ethiopia, inflation of food prices in urban areas was addressed through price controls, releasing grain reserves, and food subsidies for the poor. The persistence of rapid food inflation in 2011 and 2012, Headey et al (2012) comment, suggests that these schemes had little effect on prices.

Cambodia is a net exporter of rice. It banned the export of rice in March 2008: apparently to some effect, since the price dropped by 10% immediately afterwards. The ban, however, could not be maintained: by April there was another rice harvest, with a surplus of 2.5M tonnes, and nowhere to store this. The ban was lifted in May 2008. (Sophal 2012)

Bolivia reduced taxes on food imports, and increased taxes on food exports, which effectively banned export of basic foods, and subsidised some staples. These measures appear to have had at best limited impacts on the wheat flour market, hence only benefiting (a part of) the consumers which had direct access to subsidised bread. Particularly the poor population living in rural areas far away from the larger Bolivian towns, difficult and costly to be reached, probably did not benefit. (Perez et al. 2011, Schüttel et al. 2011)

Middle income countries had more room to manoeuvre. China is the exemplary case. It was able to sell some of its public stocks of grain, thanks to maintaining very large stores indeed; at unknown and probably considerable cost. It first discouraged, then banned exports of grains. Fertiliser exports were also controlled, since domestic fertiliser would otherwise have been exported to take advantage of booming world prices at the time of the food price spike. It subsidised the production of the most common meat, pork. Consequently food price inflation was much lower in China than on world markets, and lower than predicted by economic models. (Yang et al. 2008)

Other MICs took similar measures to protect consumers from higher prices. Egypt banned rice exports and increased the subsidies on bread and other staples, but at high cost — see below. (Trego 2011) Mexico tried to arrange an agreement that the food industry would moderate increases in tortilla prices, in return for access to cheaper maize as import quotas were loosened. Since it was easier to do this for large-scale food

processors, this inadvertently tipped the scales in their favour and against street-corner *tortillerías* (tortilla-making shops) that had no access to cheaper maize (Keleman et al. 2011).

Serbia showed the limits of such action: government attempts to control wheat prices through export bans, import limits, and state buying only managed to raise prices higher than was likely without intervention as confusion over aims, methods and the manoeuvring of large mills frustrated the policies (Djuric et al. 2012).

A common feature in these cases was the primary concern to protect consumers, above all those in cities. Urban consumers were seen as most vulnerable to rising food prices; an assumption that in many cases was probably wrong (Wiggins et al. 2010, Compton et al. 2010, Keats et al. 2011). However, almost everywhere they are an important political force. Price controls and export bans, on the other hand, were a disincentive to local farmers to produce more.

Social protection for the vulnerable

Many governments tried to offer some protection from higher prices to groups considered vulnerable. The key point, repeatedly confirmed, is that it was difficult for countries to react within reasonable time other than to expand or deepen the coverage of existing schemes.

Such programmes succeed only to the extent that target groups can be identified and monitored accurately, and institutional mechanisms needed to do so are costly. Examples include the Single Registry system in Brazil, the Chile Solidario system, the Bono Solidario system in Ecuador, and the Oportunidades programme in Mexico. Typically, these programmes are more effective in addressing the needs of the chronic poor (who can be identified over time) than those pushed into poverty by a food-price shock. [de Janvry & Sadoulet 2011]

Reviewing the extent to which thirteen highly affected countries were prepared to cope with food price shocks Grosh et al. (2011), noted the lessons that ‘the quickest, lowest cost and most sufficient safety net response will be to increase the value of a transfer already well targeted and with high coverage of the poor’ and that the ‘next best option is to work with transfer programs that are well targeted but with lower coverage’. Of the thirteen countries, they estimated that only one had strong capability, while four of them were either weak or plain unprepared — and these four constitute some of the very poorest and most vulnerable of the thirteen: see Table 1.

Table 1: Crisis response preparedness across countries currently flagged as greatly affected by food price changes

Basis for Response	Criteria	Countries [†]
Strong	Have one or more programs with high coverage of poor, highly progressive targeting and good administration	Georgia [*]
Moderate	Have one or more operating and progressively targeted programs to build on, but with less than full coverage and /or a need for administrative improvements	Azerbaijan, Bangladesh, Guatemala, India [*] Indonesia, Kyrgyz Republic, Pakistan, Mongolia
Weak	A large scale response would require fundamental changes to range, size, or targeting of programs and significant building of institutional capacity	Tajikistan,
Unprepared	Very small programs with little institutional development, often geared only to specific sub-groups of the population	Afghanistan, DRC, Haiti [*]

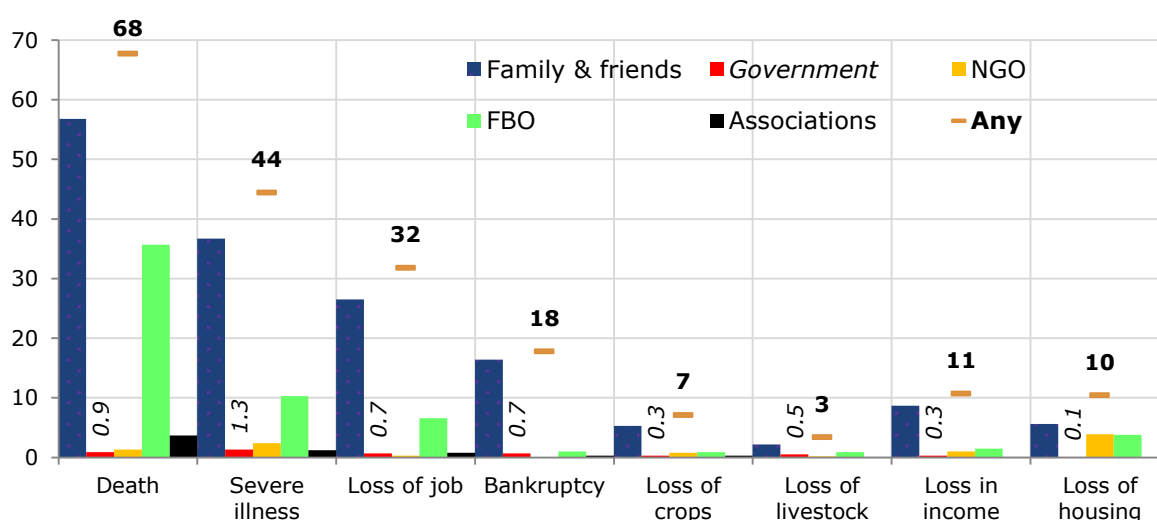
Source: Table 1.2, Grosh et al. 2011

Most **Low income countries** thus found it difficult to increase their social protection. There were exceptions. In Ethiopia, for example, an urban food-rationing programme began in April 2007 by which households with a

ration card could access subsidised wheat. Preliminary evidence suggests problems: a WFP survey of urban households found a large proportion did not have a ration card. No measures were taken in rural areas until 2008. Then the government adjusted the Productive Safety Nets Programme that had started in 2005 and reached more than seven million people in food insecure areas with direct support, and food or cash transfers to participants in public works. Resources limited what could be done. Cash wages paid in public-works were raised by one third, but in May 2008 purchasing power had already declined by 62%. PSNP also provided emergency assistance to 1.5 million people outside the project, but the population requiring assistance in October 2008 was estimated at 6.4 million in addition to PSNP beneficiaries (FEWS NET 2008). (Ticci 2012)

Another example from Heltberg et al., (2012) of the Central African Republic illustrates how few households surveyed received help from government, or even NGOs or other sources in the event of shocks over the time of the price spike. Help from family and friends dwarfed any other help available, see Figure 12.

Figure 12: Share of households surveyed in CAR benefiting from outside support in case of shocks, by shock and source of support (%)



Source: Compiled from data from Table 4.4 in Heltberg et al., 2012, originally from a 2008 survey (Central African Survey for Welfare Monitoring and Evaluation)

Many *middle income countries* did have programmes in place that could be scaled up. For them, the drawbacks were the costs, coverage of the vulnerable, and its counterpart, leakage of benefits to those who could afford more costly food.

Egypt illustrates the problems. It already had in place food subsidies: coarse bread was sold at a fixed price of just 0.05 Egyptian pounds per loaf (c. US\$0.01); while those with ration cards could buy sugar, rice, and edible oil up to a quota from designated shops. In the 2007/08 crisis, they expanded the number of subsidy recipients. In the summer of 2008, two major changes were made to the ration-card system: partial-subsidy ration cards intended for higher-income households were converted into full-subsidy cards; and an extra 22 million people born between 1989 and 2005, previously unable to register on the family ration card, were added to the cards.¹⁰

¹⁰ Management of change was ham-fisted. In December 2007 of all times, the government announced a plan to move from food subsidies to cash-transfer system. Given rising prices, it was not surprising that this provoked public indignation. Riots broke out.

By adding an unprecedented number of individuals to this social safety net and eliminating the distinction between full and partial subsidies, the targeting of the system became even more inefficient. (Trego 2011)

The costs, moreover, were high.

Food subsidies were increased over the original 2007/08 budget allocations by a total of 5.8 billion EGP (\$1.07 billion USD) to 15.3 billion EGP (\$2.82 billion USD, that is, 1.8 per cent of GDP) to finance higher international food prices, and to disburse additional amounts of rice, sugar, and edible oil on rationed cards.

...

'The Egyptian government spent more than US\$ 5 billion in the 2007–08 fiscal year on subsidising bread and several basic staples for the majority of its 75 million citizens' (Ministry of Finance 2008, quoted in Trego 2011)

India expanded its distribution of food at low prices through the fair price shops, but imperfectly. Four problems were noted by Dev (2011): high exclusion errors; non-viability of fair price shops; not fulfilling the price stabilization objective and, leakages that vary enormously between states. In Bihar and Punjab, leakage exceeds 75% while in Haryana and Uttar Pradesh it runs between 50 and 75%. Critics have long argued that the public distribution system should be commuted to cash transfers, claiming that it takes five rupees in costs to deliver one rupee of benefit (see, for example, Farrington et al. 2003).

Some MICs brought in new programmes at the time of the spike to compensate for food price inflation. In 2008 the Government of Pakistan began the Benazir Income Support Programme (BISP), which provides cash transfers of 1,000 Rupees to poor families identified by the government on the basis of its poverty scorecard census. (Friedman et al. 2011) It began with more than 3M families enrolled; subsequently it has been expanded to cover 5M households.

Should (MIC) countries with the means, stabilise prices, or protect their vulnerable citizens? Argentina and Brazil provide a useful comparison. Argentina (Nogues 2012) tried to stabilise domestic prices by limiting exports and taxing them — thereby generating a windfall to the government of US\$9 billion in 2009. International agreements on trade, such as those under Mercosur, were set aside. Farmers were heavily taxed, with frequent and unpredictable revisions sufficient to create uncertainty. The result was that farmers reduced production, and cut back on cattle herds, so production fell and prices rose strongly 2009 to 2011. Argentina undermined its own leading export sector, while ultimately seeing domestic food price inflation: an astonishing own goal.

At the same time Brazil (Bento & de Freitas 2012) took the opposite approach. It allowed domestic food prices to follow those in world markets — helped by a 37% appreciation of the Real against the US dollar, but then acted strongly to protect vulnerable Brazilians from higher prices through the Fome Zero and Bolsa Familiar programmes. At the same time, subsidised credit was delivered to small family farmers, while a public food procurement programme favoured buying from them. The result was striking: annual surveys of food security in Brazil shows that this improved from 2004 to 2009.

Policy choices, if it needed to be restated, do matter.

Importance of coping for most people

Although most developing country governments did try to respond to higher food prices, their ability to protect their citizens was often limited. Most of the field surveys of households find that few households received any direct support from government, especially in LICs. For example in Afghanistan, only 7% of households reported getting government food assistance between August 2007 and September 2008 (de Souza & Joliffe 2010); Sophal (2012) reports few households assisted in Cambodia. Most households looked to their own means of coping, as will be reviewed in the next section.

Promoting domestic food production

Given that LICs often have few options for responding to food price spikes, expanding domestic production may be both more feasible and effective in reducing prices and protecting the vulnerable poor than other instruments. Many LIC have additional land and labour to deploy, while current levels of productivity are so low that significant improvements are possible. (de Janvry & Sadoulet 2011). So what is known of efforts to increase staples production?

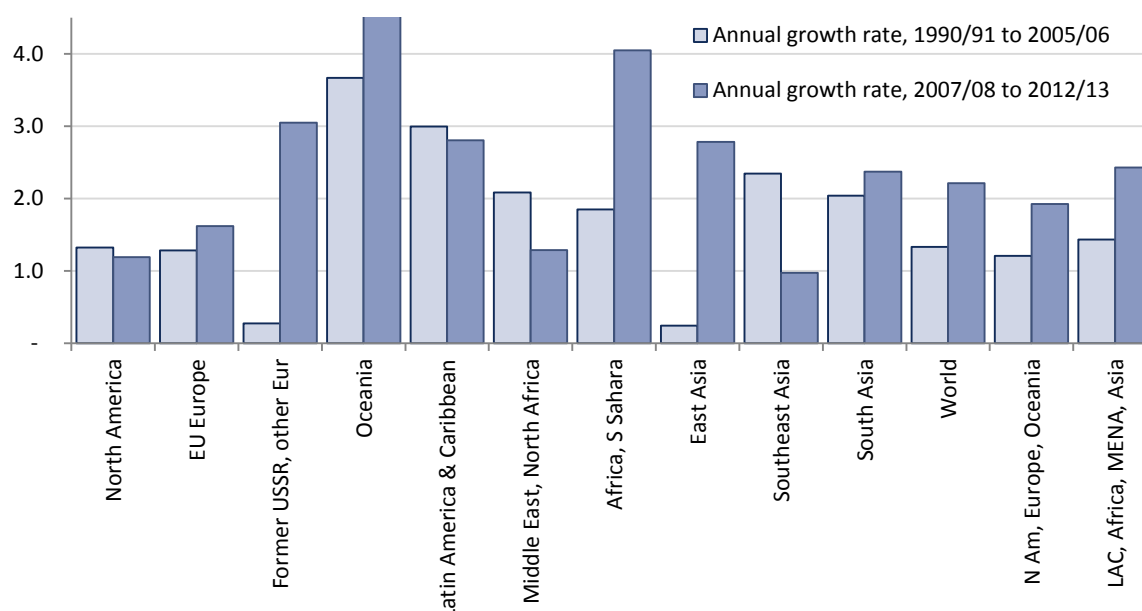
Mali launched a rice initiative that saw credit, seeds and fertiliser given to farmers in 2008/09. Coverage was limited, inputs often delayed, not always of good quality. Rice harvests may have increased by about 20% as a result. (Smale et al 2011, Galtier et al. 2009). Similar programmes were seen in Burkina Faso, Niger and Senegal. (FAO 2011)

India increased its minimum support prices by more than 50% between 2005/06 and 2007/08. Public procurement of wheat, while low in 2006/07, increased strongly in 2007/08 when a record 22M tonnes were procured compared to 9MT in 2006-07. (Dev 2011)

China increased direct payments to grain farmers, subsidised those adopting improved seeds, raised minimum procurement prices for wheat and rice, and perhaps most importantly, significantly spent more on subsidising purchased inputs, mainly fertilizer. (Yu & Jensen 2012, Yang et al. 2008)

The success of these efforts is not well recorded: at the same time that some governments were encouraging production through cheap inputs, they were banning exports and thereby reducing the prices that farmers might have received. Conversely, in countries where little was done to encourage production, the stimulus of higher prices alone may have encouraged more production. As Figure 13 shows, world production grew faster after 2007/08, an acceleration that was all the more marked in the developing world, within which the most notable increases can be seen for Africa south of the Sahara and East Asia. Surprisingly, growth rates fall for Latin America, the Middle East & North Africa and for Southeast Asia. For some countries this may reflect the disincentives of trade and price controls.

Figure 13: Growth of production of cereals, before and after the 2007/08 spike, average annual growth rates



Source: Compiled from USDA production data

Note: the Oceania growth rate is truncated on this chart: the figure is above 12% a year for 2007/08 to 2012/13

Public responses: summary

Most governments tried hard to react to higher world food prices.

Low income countries, however, despite the aid they received, struggled to make a difference. They had few means by which to mitigate price rises, either at the border, or on domestic markets. Most of the buffering of international price rises came through the natural protection of high transport costs to ports. Not that this was an advantage for those LIC distant from the sea: protection left them highly vulnerable to price volatility from domestic harvests.

When it came to protecting vulnerable citizens, again they often faced the twin challenges of not having existing safety nets in place that could be scaled up when prices rose, combined with not enough resources to provide adequate protection in countries where half or more of the population were in danger of impoverishment and hunger.

Most tried to stimulate domestic production, yet once again LICs have few means by which to do so: distribution of seed and fertiliser were costly exercises, promising farmers higher prices was unthinkable for lack of funds.

Middle income countries, on the other hand, often have much more scope for action, thanks to their greater administrative capacity, deeper funds to draw on, and often a smaller share of population to protect. With agriculture a smaller share of the economy, offering farmers higher prices or subsidised inputs was feasible. Having the means and acting effectively or efficiently, however, are not necessarily linked. Several countries report problematic experiences, Argentina being an example.

Across countries, higher food prices were commonly seen as a threat to the lives of poor urban households with less appreciation that poor rural households might be equally vulnerable. In any case, for many countries it was administratively easier to protect urban rather than rural households. Urban households, moreover, were better placed to protest in the face of price increases. Hence responses tended to show a bias to urban areas.

Overall, most surveys report that not many vulnerable households received assistance from the state during the food price spike. Despite considerable public efforts, for most threatened households, it was their own ability to cope that mattered.

2.4 Impacts

We need to be more honest about what we do and do not know. [Swinen & Squicciarini 2012]

Five years after the spike, impacts are not that clear. Three types of analysis can be seen in the literature, ordered by the timing in which they came to prominence: the first assessments of probable impacts used logical deduction and quantitative models; later came findings from surveys of individuals, households and focus groups vulnerable to higher food prices; while later still came reviews of indicators of overall outcomes that can help to put the impacts into perspective. So what do these different strands suggest about impacts?

Modelling

It is not surprising that early assessments relied on modelling. Faced by an unexpected shock, with policy-makers anxious to understand the likely impacts both to draw attention to the problem and assess responses, models and deduction are the only way to generate answers within a few weeks. Quantitative models have the added advantage of generating numbers that fire imaginations. The most striking of these were the results of brief, back-of-the-envelope calculations that extended the results of some modelling by Ivanic & Martin (2008): this produced the headline figure that the food price spike had probably led to another 105M persons being pushed into poverty. This statistic was then used by the President of the World Bank, after which it was cited numerous times — with little reference to the many simplifying assumptions that lay behind it.

At least ten such exercises appeared within a year or so the spike (see Compton et al. 2010, Table C). Many of the models were built around household economics, drawing on survey data that showed how much households spent on staple foods and other expenses. They then predicted from this what the impact on consumption of food might be, and the consequences for other expenditure, were food prices to rise by the amounts being seen on the world markets during the spike.

Most of the modelling made no great claims for the results, since authors were often at pains to explain the simplifying assumptions they had to make to run their calculations. Important assumptions concern the degree of transmission of international prices, typically taken either as complete pass-through or else assumed to be some proportion, such as two-thirds, the change seen on international markets. In reality, transmission varies considerably between countries. Another important set of assumptions are the extent to which the model accommodates second round effects resulting from price increases. In some models, for example, when prices rise households are assumed to continue to consume the same diet, as though there were no elasticity of consumption with respect to price. Some of the computable general equilibrium models try to capture ramifications throughout the economy, but many models are simpler than that and focus on short-term changes — partly since the questions posed by some decision-makers were in terms of who might lose in the short run and might therefore be compensated or assisted.

Some models were highly influential in drawing attention to the extent to which many poor rural households were net food buyers, even if they farmed and prioritised food crops. In their recent review, de Janvry & Sadoulet (2011) stress this point, collecting statistics presented in Table 2. In most of the countries, the majority of smallholders are net buyers of staple foods, leading them to comment:

This is the main message from this study. Because world poverty is mainly rural, because most of the rural poor are smallholder farmers, and because a majority of smallholders are net buyers of rice, wheat, and maize, they should have been at the forefront of concerns about the impacts of a global food-price crisis.

Table 2: Net buyers among smallholder households

Country	Category	Commodity	% Net buyers	Source
Sub-Saharan Africa				
Zambia	Smallholders	Staples*	46	World Bank (2007)
Mozambique	Smallholders	Maize	63	Jayne et al.(2006)
Kenya	Smallholders	Maize	62	Jayne et al.(2006)
Ethiopia	Smallholders	Maize & teff	73	Jayne et al.(2006)
Latin America				
Guatemala	Smallholders	Maize	97	Authors
Bolivia	Smallholders	Staples	70	World Bank (2007)
Peru Sierra	Farmers	Maize	93	Authors
Asia				
India	Smallholders	Rice	74	Authors
Bangladesh	Smallholders	Staples	59	World Bank (2007)
Vietnam	Smallholders	Staples	40	World Bank (2007)
Cambodia	Smallholders	Staples	32	World Bank (2007)
Unweighted average			64	

Source Table 1, de Janvry & Sadoulet 2011.

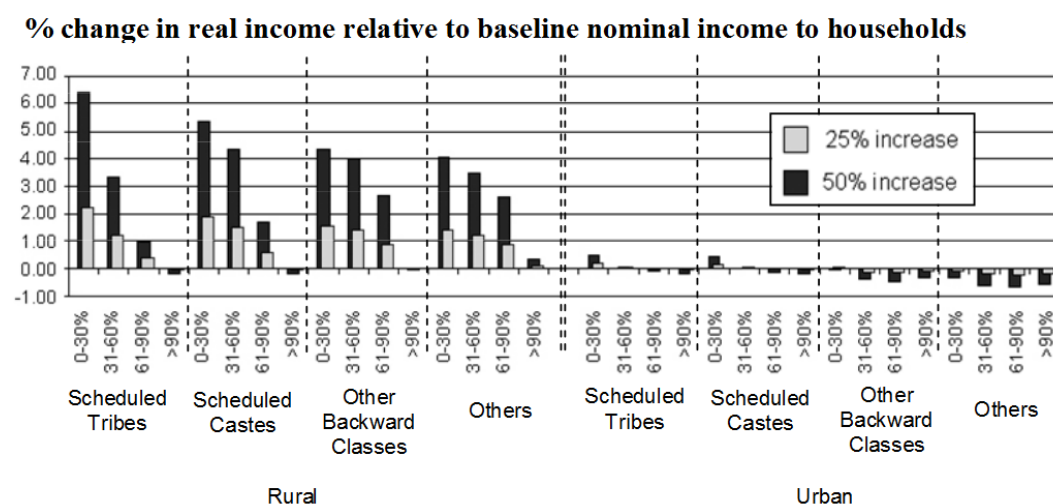
Note * Staples include rice, wheat, maize, and beans.

Since so many the rural poor appear as net food buyers in the databases used by the models, then many of those models showed rising poverty and declining welfare for rural households. A recent updating of this sort of model for nine developing countries for which there are detailed data on households derived from Living Standards Measurement Surveys — Bangladesh, Ghana, Guatemala, Malawi, Nepal, Nicaragua, Pakistan, Panama and Vietnam — shows that since most rural households are net buyers of staples, they stand to lose from higher staple prices in the short run (Filipski & Covarrubias 2012). But this also reports that the size and timing of welfare shocks depend heavily on type of crops produced and consumed by each rural household.

The interplay of different price shocks, and differences in the composition of crops in households' production and consumption, significantly complicates outcomes. For example, while for Guatemala and Nicaragua it seems that higher agricultural prices tend to affect richer and poorer households similarly, not so for Malawi and Bangladesh where a negative shock led to a clear widening of welfare disparities.

Most models did show that poor rural households would lose from higher food prices, but not all did. A striking, but little reported outcome came from a computable general equilibrium model for India, see Figure 12. This expects substantial gains for households, above all the poor and disadvantaged — thanks to gains in the labour market.

Figure 14: Impact of higher world price for rice on Indian households



Source: Polaski 2008, Figure 4

Models can be powerful in suggesting how processes may play out; although since ...

... models use different methods, poverty lines and assumptions about price increases, pass-through [from international] to domestic prices, substitution effects, and wage effects. Also, some include net [food] sellers while others do not. (Lustig 2009)

... it is not surprising that they can produce differing results.

The most significant fault line that the models have exposed lies in considerations of the effects of higher or lower farm prices on rural poverty. As Swinnen & Scuriarini (2011) complain, before the spike it was common to see both researchers and poverty advocates lamenting the way in which the Common Agricultural Policy of the EU tended to depress prices of cereals, dairy and beef on world markets; on the grounds that this meant lower prices to poor smallholders who might otherwise earn more from their marketed output. Yet the moment the price spike was clear, many of those poverty advocates argued that higher prices hit the poor hard as net food consumers. Clearly rather different models, with different assumptions and data bases, underlay these opposing propositions.

Survey results

Given the varying predictions of models, then what was reported when surveys were carried out amongst those households and communities considered vulnerable to higher prices?

Coping strategies

The most common report was of households coping with the higher prices. The most common reaction was that of cutting spending on more expensive foods to leave funds for the staples as well as cutting spending on less essential items such as clothing. Borrowing to cover costs of living was another frequent report. In some cases households found ways to work and earn more. After those reactions come indications of distress: sales of assets, beginning with consumer goods, with land, tools and livestock sold only after that buffer was exhausted. There were also some reports of going without meals.

Hardship is common in these accounts: the more worrying indications are when diets become less diverse with the threat of micro-nutrient deficiency or not preparing adequate weaning foods for highly vulnerable infants; and where productive assets are lost¹¹.

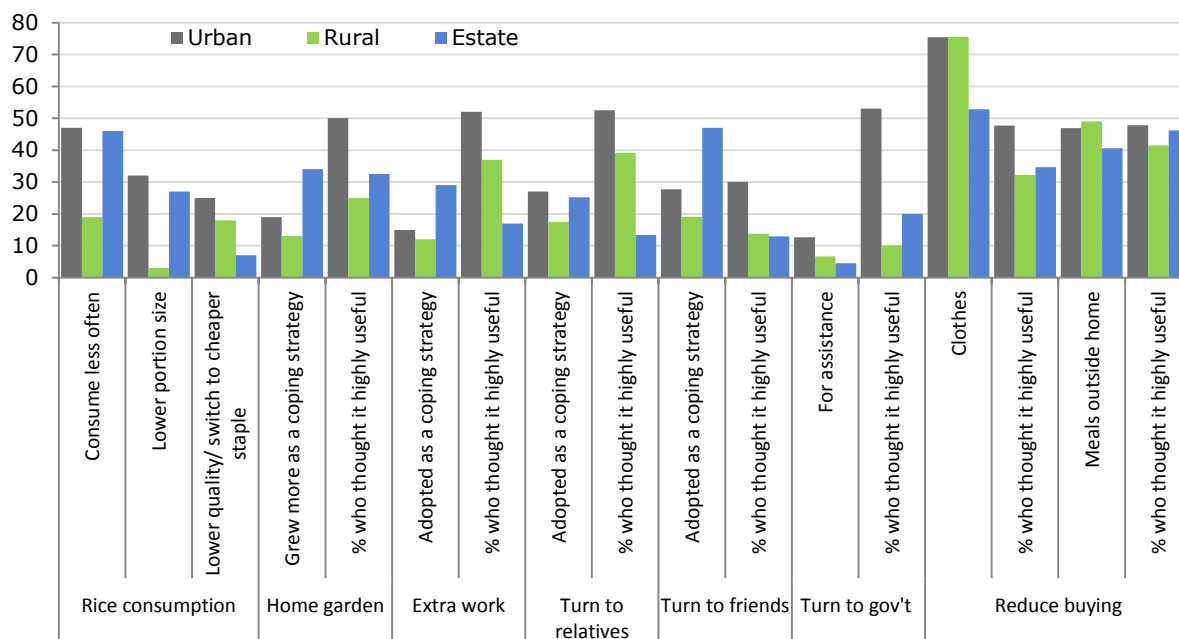
Some examples illustrate. For Ethiopia, women reported cutting back on the number of meals they provided their households during good months and eating less preferred foods. Switching from rice and maize to cheaper starches like millet and cassava meant spending longer processing and cooking, thereby taking up women's time and detracting from other productive activities, childcare, and needed rest. Female-headed households had fewer resources, years of schooling and smaller networks. These households experienced more months when they could not fulfil their food needs. Consequently female-headed households were 5–15 percentage points more likely to experience loss of income, consumption, or assets as a result of a food price shock. (Kumar & Quisumbing 2011). Gendered impacts were likely pronounced generally, with heavy burdens falling on women who continued to shoulder the lion's share of household responsibilities, while working longer hours to save money or earn income¹². Furthermore domestic violence has sometimes risen owing to the stresses of coping or from men being out of work. (Heltberg et al. 2012)

Around Kandy in Sri Lanka, urban, rural and estate — those working on tea estates — households reported coping first and foremost by cutting spending on clothes, then on meals outside the home, see Figure 15. Although only a minority reduced their consumption, for urban and estate households, this was still more than 40%.

¹¹ Some research also stressed that though informal safety nets are the most critical aids to people's coping, stresses of protracted or recurring crises can place excessive burdens on communities that lead to community means of coping being worn away by attrition. (Heltberg et al., 2012)

¹² Women are often expected to go without meals, or to devote long hours to saving money such as walking to save fuel, sewing clothes, and collecting wild resources. They also find it more difficult to get formal jobs, and are often among the first to be laid off (Heltberg et al., 2012)

Figure 15: Coping by households in Kandy, Sri Lanka



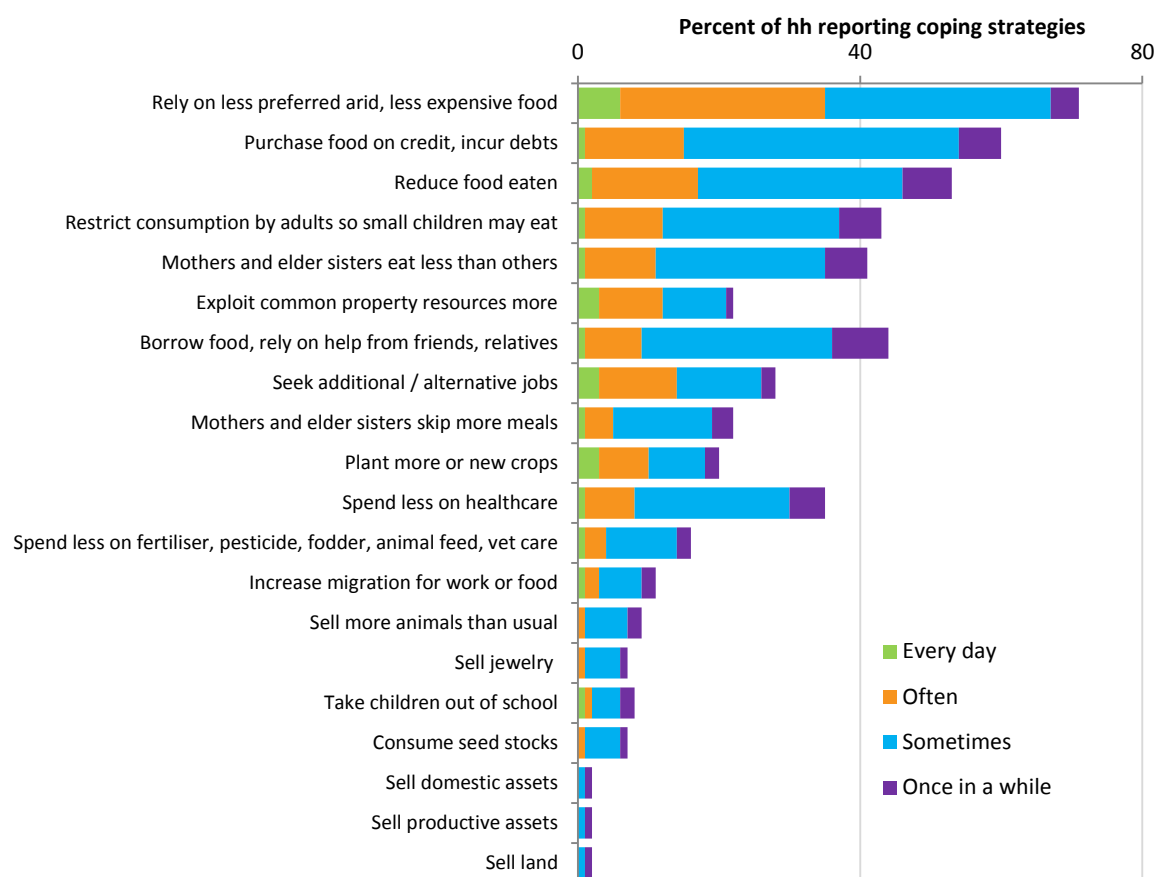
Source: Kodithuwakku & Weerahewa, 2011

Hunger and destitution were not prevalent; the main concern here is switching consumption away from more diverse foods to save cash. (Kodithuwakku & Weerahewa 2011)

For Cambodia, the poor were hit by rises in prices of both rice and fuel: day wages, important for many of the poor, rose 35% to 67% over a year by the time of the survey in June 2008 and provided some protection but not enough to match the rise in the rice price. (Sophal 2012) Fishing villages were hit harder than most, since the fish price rose by only 20%.

Coping follows the expected patterns, see Figure 16, of cutting spending, borrowing, then reduced eating, borrowing, seeking extra income and so on through to selling productive assets as the last straw — fortunately in this case reported by only a small fractions of households.

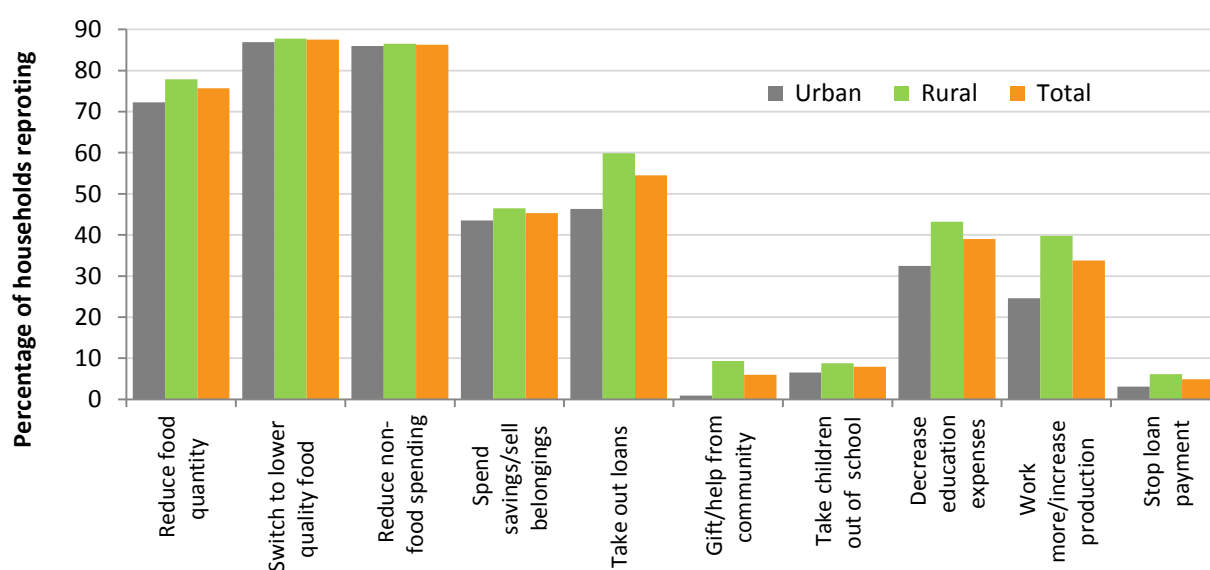
Figure 16: Coping in rural Cambodia



Source: Sophal 2012, from Table 2 based on national survey of 2,235 households in June 2008

This pattern of coping looks similar to that reported for Bangladesh (Dev 2011).

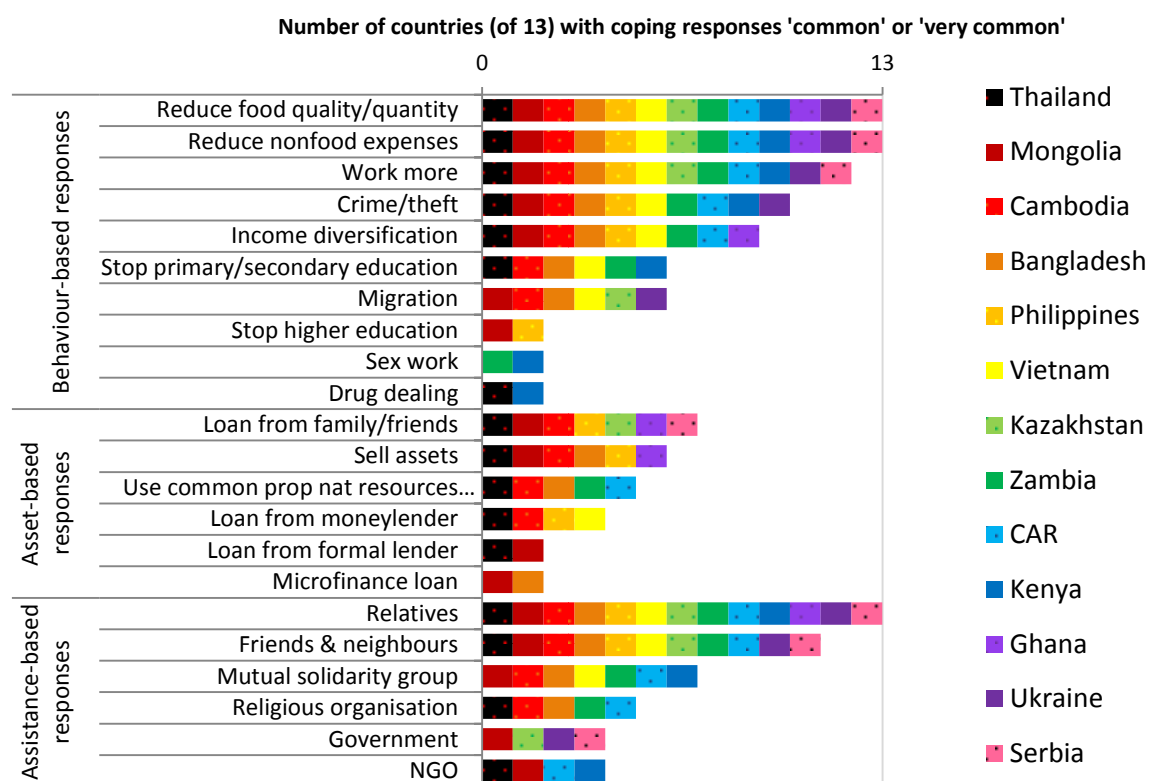
Figure 17: Coping in Bangladesh



Source: Development 2011, reporting Viswanath 2009

Reducing food consumption, spending less on other things, diversifying incomes, and even theft of food, including from farmers' fields, were reported as common in thirteen countries, see Figure 18 (Heltberg et al., 2012). The most common sources of assistance were relatives, friends, and neighbours.

Figure 18: Coping responses cited as 'common' or 'very common' in qualitative surveys



Source: Compiled from data from Table 1.1 in Heltberg et al., 2012.

Note: Data from qualitative research in this study is not meant to be nationally representative, rather, sampling and site-selection was intended to cover a range of social groups/occupations presumed vulnerable. For this reason, the CAR focus groups record NGOs as a 'common' or 'very common' assistance-based response, though less than 4% of households cited getting any assistance from NGOs for any given shock in the national survey conducted in 2008, see Figure 12).

For Afghanistan, rising wheat prices saw the better off households cut consumption — but that was because they already had more than enough rice, and were using some for entertainment and hospitality; while the poorer households did not cut wheat consumption, but rather reduced the quality of their diet, moving away from nutrient-rich foods like meat, fruits and vegetables toward staples like wheat. Some of the poor actually increased their wheat intake to compensate for less of other foods, so that wheat became a Giffen good: with more consumed as prices rose. (De Souza & Joliffe, 2010 & 2012)

In Pakistan, vulnerable households coped with higher wheat prices by drawing on savings, selling jewellery, and in some cases, selling livestock. (Friedman et al. 2011)

A study that uses listening posts in selected communities of Bangladesh, Indonesia, Kenya and Zambia (Hossain & Green 2011) adds useful insights into daily realities. For the poor, the higher food prices meant working harder and longer, eating less, living more frugally, drawing down on assets, and managing day by day: the daily grind becoming more arduous in a process of attrition. In Bangladesh, for example, the result is not starvation or even destitution, but lives lived with more discontent and stress.

The focus groups that form the heart of this research showed how much people resented the changes. They contested official explanations of the causes, and roundly criticised their government for failing to act

effectively. They saw the problems faced as political, identifying a lack of responsiveness to their needs, as well as corruption and collusion among powerful politicians and business interests.

Similarly, focus groups in thirteen countries report emotional costs and stresses, exhaustion, and increasing tension arising from the difficult choices faced by people in poverty when shocks and stresses happen (Heltberg et al. 2012).

Welfare changes

A problem with accounts of coping is that it is not always clear how serious the problems are. So what do surveys report about welfare changes?

Living standards were cut and poverty deepened. For Pakistan, compensating variation estimates suggest that the average household would have needed another 38% more to spend to maintain pre-crisis consumption. On average households had 8% fewer calories of food to consume (Friedman et al. 2011)

In Bangladesh, four rounds of surveys since 1988 showed just how the price shock had reversed trends towards less poverty, often based on diversifying livelihoods out of farming, see Table 3. (Balagtas et al. 2012) From 1988 to 2004, prices of farm output were falling, agricultural incomes were stagnating making non-farm jobs the route out of poverty. The unexpected rise in agricultural prices since 2004 reversed the fortunes of farm households with access to markets. At the same time, a global economic recession may have limited income opportunities in other sectors.

Table 3: Measures of Rural poverty in Bangladesh

Poverty measures	1988	2000	2004	2008
Head count index	61.6	48.2	43.9	55.9
Poverty gap ratio	26.4	19.1	16.5	21.9
Squared poverty gap	14.4	10.2	8.5	11.1

Source: Balagtas et al. 2012

Food security and nutrition were also under threat. Surveys of urban households in Ouagadougou, Burkina Faso in 2007 and 2008 reported that while 33% were food secure in 2007, this was reduced to 22% a year later as prices of food rose — especially those of fish (113%), cereals (53%), and vegetable oil (44%), increasing the household monthly food expenditure by 18%. The rise in spending was not enough. Diets became less diverse, with fewer fruits and vegetables, dairy products, and meat/poultry being eaten. (Prevel et al. 2012)

In Guinea, global acute malnutrition (GAM) rose in four out of six prefectures between 2007 and 2008. (Peeters & Maxwell 2011)

In Cambodia, a national survey found that rural households had worse food intake than urban. More than 300,000 households, about 1.7 million people, or 13% of the population were classed as food-insecure by the WFP method in May–June 2008: the vast majority of them in rural households. (Sophal 2012)

Since the most common reaction was reducing the diversity of the diet, micro-nutrient deficiency — already the most common nutritional problem — may deteriorate (Brinkman et al. 2010). Given that this is not so easy to detect, and may not be seen for what it is by those affected, the worry is it will go unattended. Monitoring of micronutrient status is one area where information is acutely lacking¹³:

¹³ Priorities include not only conducting regular sample surveys of consumption, but also monitoring of deficiencies in young children and mothers, where currently nationally representative surveys in LICs take place less than once a decade: surveys at least once every 5 years are needed if levels and trends are to be established.

With so little reliable information, problems do not get the political priority their seriousness would imply; while policy-makers have to make guesses about the measures that might be effective. (Keats & Wiggins, 2010)

Coping, perhaps reasonably well

So far, so bad. On the other hand, some reports show that some relatively poor households were little affected by the price spike. In Guinea, households that grew their own food and had stocks of rice were the least affected by the spike (Peeters & Maxwell 2011).

For Mali, critical factors were less the price of food so much as the ability to produce locally: the country had seen increasing levels of self-sufficiency in staples (Moseley 2011), helped by donor investments in better roads.

The price of imported rice rose sharply in Côte d'Ivoire, but impacts were mitigated by people switching to locally-grown roots, tubers and grains, and by the rise in cocoa prices. Overall, the rural poor may have gained given the importance of the latter. Buffering was so strong that the authors concluded:

Furthermore, when both cash and food crop production is taken into account, the negative impact of a food price shock becomes negligible. Finally, we find that staple food price shocks are likely to induce reallocation of income from households residing in relatively richer urban and Southern parts of the country towards relatively poorer rural and Northern parts of the country. [Dimova & Gbakou 2012]

It seems the main losers in this case were some of the urban lower middle classes who had become accustomed to eating imported rice: for the urban poor, this was not part of their diet.

Similar buffering by switching consumption seems to have taken place in Vietnam, where it seems that as the price of premium rice rose, the vulnerable switched to lower grades of rice (Gibson & Kim 2012). Policy to improve rice quality, paradoxically might threaten coping by the poor.

In Bolivia, rising prices saw smallholding households reverting to eating their own produce: native potatoes and other tubers, quinoa, beans, and tarwi (a lupin). Focus-group participants explained they grew diverse crops and livestock for both consumption and sale so they had these options. (Perez et al. 2011)

Positive effects and some overall outcomes

Most models predict welfare losses from higher food prices, many surveys seem to back this up. Yet there are doubts about how damaging the higher prices may be: doubts that stem from greater farm incomes from higher prices, incentives to farmers to invest and innovate, and the multipliers in rural economies from increased farm incomes that should spread the benefits to those with little or no land. So what evidence is there of such effects?

Not much appears in the literature searched, but that may simply be that researchers are not looking for such impacts. Exceptions include Cambodia, where Sophal reports (2012) that farmers did not cut back on fertiliser despite rising costs, since they wanted to take advantage of high paddy prices. To make sure they got their fertiliser they took out loans. Farmers were also trying to increase cassava production given the good prices on offer for that crop.

In Bolivia a quinoa boom was seen with such high prices being paid for the once little-known and little-valued grain, that farmers could buy several times the weight of quinoa in rice and hence were happy to market the quinoa. (Perez et al. 2011)

Surveys from Indonesia showed farmers investing as prices rose: the issue here was that it was the better-off farmers who were able to do so, whereas the poorer farmers lacked cash and could not get credit. Poor farmers apparently took any increased incomes as savings or consumption, rather than investing. Hence the effect could be to widen income gaps in rural Indonesia (Nose & Yamauchi 2012). This study cites World Bank evidence that the positive impacts on producers seemed to outweigh the negative effects on consumers' welfare in Indonesia.

Similar arguments come from Hella et al. (2011) in their survey of Ethiopia, Malawi and Tanzania. They found that the only small farms to respond to higher prices were the better-off in the higher potential areas. This was seen in parts of Ethiopia and Tanzania but not in Malawi.

Very few studies report changes in rural wages that would be indicative of multipliers. The exceptions are Cambodia where Sophal points out the increases in rural wages, of 35 to 67% in a year, did not match higher food prices. That, however, is not the end of the argument, since while prices may have fallen back after the spike, did the wages? If they did not fall back, then labourers might have been better off.

For Ethiopia, Ticci (2012) believes that rural wages rose by 30%, but apparently data to confirm that are lacking. For the Philippines, Santoalla (2011) sees agricultural labourers as significant losers from higher food prices and does not mention any compensating wage increases.

All told, evidence for strong effects through a stimulus to the rural economy is sparse.

So what do studies that look at overall impacts find? Two produce striking results. Headey (2011) looked at Gallup public polls in developing countries that are now carried out regularly. These include questions about food security:¹⁴ asking about the affordability of food and incidences of going hungry. Statistics from these indicators correlate across countries with incomes, poverty and nutrition statistics; so they may be trustworthy indicators of food security.

The Gallup polls show that for a sample of 70 countries, food insecurity rose slightly from 2007/08 to 2008/09, from 39.1% to 39.8% of households responding. If however, the mean is weighted by population, then food insecurity falls from 35.3% to 26.2%: a remarkable reduction. For a smaller sample of 57 developing countries for which there were data for 2005/06 as well, then the change sees the numbers estimated to be food insecure fall from 1,502M in 2005/06 to 1,191M in 2008/09: a fall of more than 310M.

This is a remarkable result, considering that the World Bank and FAO repeatedly stated that the food price spike had pushed more people into hunger and poverty. On the contrary, by Headey's calculations in just three years almost 20% of those previously food insecure were no longer so. The plausible explanation lies with the large positive changes seen in some very large countries, with China and India to the forefront. Not only did these countries see less food price inflation, but also their economies were growing, incomes rising, and poverty falling. Indeed, Headey shows that across countries economic growth does more to relieve food insecurity, than food price inflation does to harm food security.

This study has been imitated for Sub-Saharan Africa, where data on self-reported food security have been taken from Afrobarometer and Gallup surveys covering 50,000 representative respondents (Arora et al. 2012). This found that food insecurity increased in incidence by a small margin between 2005 and 2008, despite large price increases, while the depth of food insecurity may actually have reduced. Even more surprising is that rural food insecurity appeared to fall. The detail is revealing:

In particular, food security apparently improved for net food-producers in our sample, both at the micro-level (among the rural households) and macro-level (among the net food exporting countries). Although rural respondents report much higher food insecurity than urban respondents in all three survey years, the rural-urban gap became narrower over the period 2005-2008, as urban food insecurity increased and rural food insecurity declined on average.

We also find that it is highly likely that strong GDP growth over the recent years has improved food security in a large number of SSA countries, compensating a possible negative impact of food price increases even on net food consuming households. [Arora et al. 2012]

This suggests that indeed the positive effects of higher prices posited for rural economies may well have come to pass.

¹⁴ 1. "Have there been times in the past 12 months when you did not have enough money to buy the food that you or your family needed?" 2. "Have there been times in the past 12 months when you or your family have gone hungry?" In both cases the responses are either yes or no.

Nutrition surveys

By now, for many developing countries results from nationally representative nutrition surveys before and after the spike are available. What do they show?

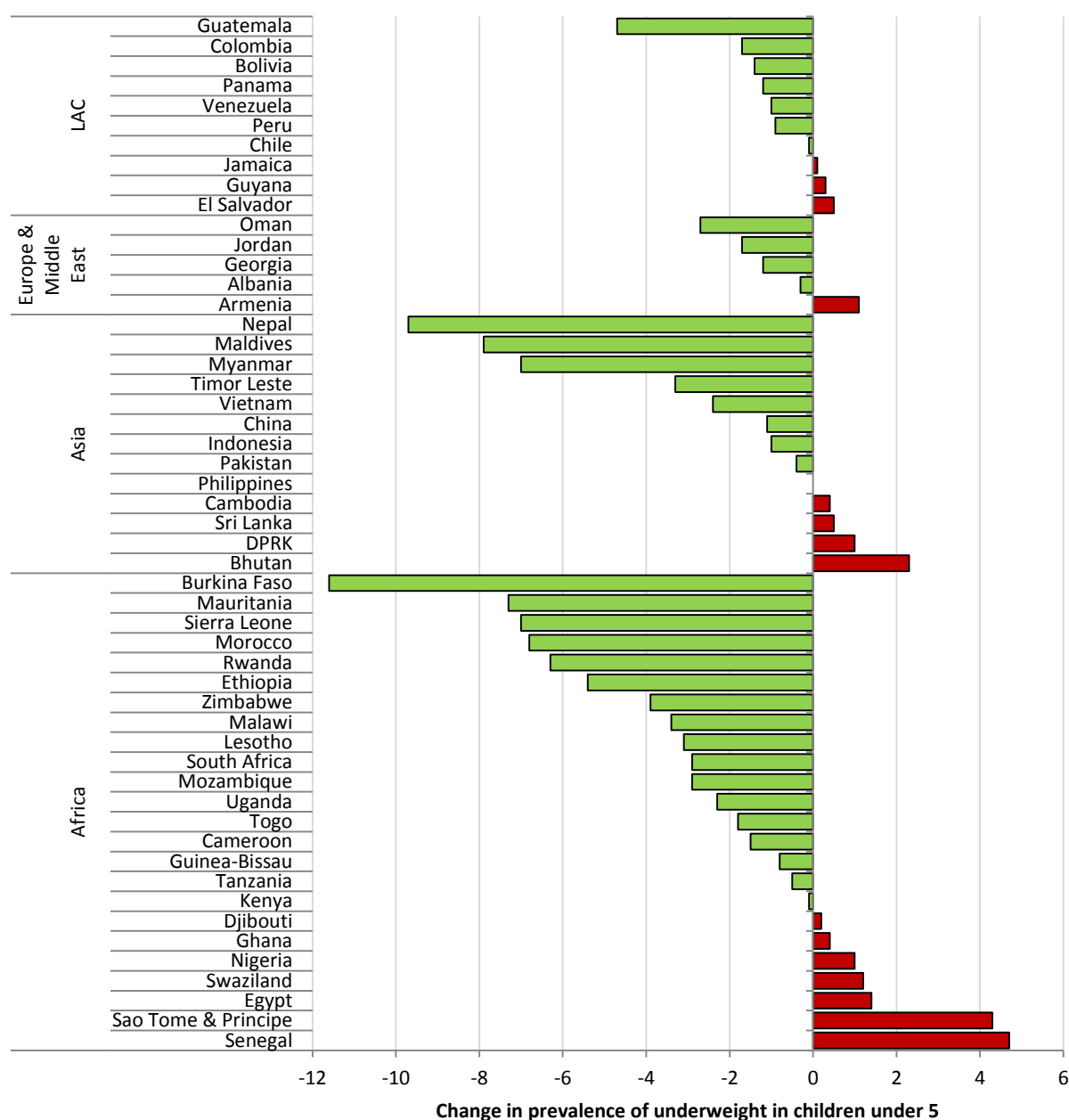
The results are striking. Taking the case of the change in incidence of children underweight before and after the spike, for the large majority of countries for which statistics were available, the changes show an improvement in child nutrition. Moreover, the improvements are often by large amounts, especially in Africa. There are ten countries where the improvement was four or more percentage points over a three or four year interval: that is, more than one percentage point improvement a year. Historically, this is good progress.

How should these slightly surprising, but welcome, results be interpreted? To begin, there is no counterfactual to hand: it may be that the outcomes would have been even better in the absence of a price spike. Nutrition is a complex outcome, the result of changes in access to food, but equally important of changes in its use by children that depends on their health and the way they are cared for. So the changes in nutrition statistics may have nothing to do with food, but come from improvements in health care, water and sanitation and nutrition education leading to better child care. Or it may be that for many households the higher prices of food were outweighed by higher incomes.

Another qualification is that these are national statistics: perhaps the results for households in the lower parts of the income distribution would be worse. Inspection of results broken down by urban and rural areas does not show any notable difference to the overall picture. Moreover, it would be expected that the majority of the infants who are underweight would come from households in the lower part of the income distribution.

Even with these qualifications, however, the results make it difficult to argue that the price spike led to lasting damage for infants across the developing world. If the survey evidence reported is a guide, the higher prices on their own would have increased hardship. If this is not reflected in these overall statistics, then it seems that there have been compensating improvements in livelihoods during the price spike that have for most countries more than offset the harm expected from higher food prices.

Figure 19: Change in prevalence of children under 5 underweight from before and after the price spike



Source: Constructed with data from WHO Global Database on Child Growth and Malnutrition: nationally representative surveys from before and after food price spike of late 2007 – 2008. See details of surveys used for each country in Annex.

Note: Statistics show proportion of children aged under five years who were 2 or more standard deviations below the median for their weight compared to their age, using the new WHO standards.

Summary and discussion of impacts

Five years after the food price spike, the impacts are not entirely clear. Models and surveys show hardship and suffering for households vulnerable to rising food prices. Yet overall surveys often suggest that food security and nutrition improved in many countries.

This is not so surprising: changes in food prices are only one factor affecting income, food security and nutrition. At the time of the price spike developing countries were also experiencing rising costs of fuel as the oil price soared, the start of the effects of the financial crisis in Europe and North America, and, most important of all, the performance of their own economies in creating jobs and incomes — and the performance of their governments in providing public goods and services, and social protection. Trying to separate out then the effects of higher prices for staple foods from all of these other confounding variables is a challenge.

There is a problem with time scales. Short term impacts of higher prices can be strong since there is little time to adjust in consumption and earning more from the opportunities that come with higher prices: with time households, farms and firms may adjust, public policy may help, and so negative effects may be much mitigated. On the other hand, with time short-term coping may prove difficult to sustain and vulnerable households may slide into deep poverty and destitution as they exhaust their options.

Any rise in prices of essential items such as staple foods will entail some hardship. The more important question is whether the price spike resulted in some hardship for vulnerable households, or whether it has led to permanent damage. If this latter were the case, then it should show up in the nutrition of infants: they are usually the most vulnerable members of vulnerable households. Yet the statistics do not show a general trend towards damage.

The simple interpretation may be that for vulnerable households, the food price spike was not that much of a problem provided that the household lived in a fast-growing economy with a reasonably competent government capable of providing the public goods and services to ensure that growth provides wide benefits and able to protect the vulnerable. Those vulnerable households living in countries with slow growing economies, with governments barely able to fulfil their functions and unable to react effectively to the spike, may well have suffered. This line of thought will be developed in chapter three.

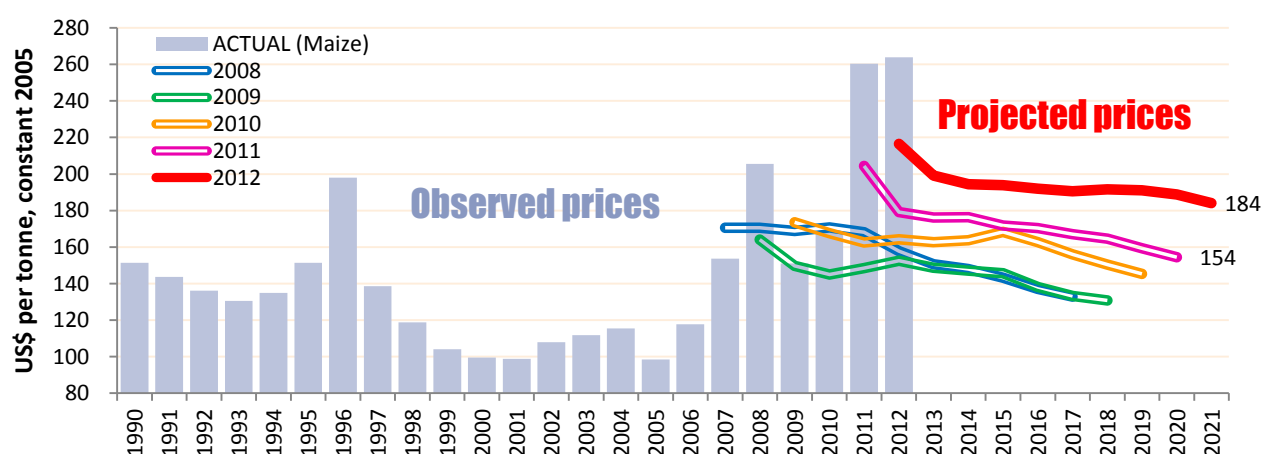
3 Peering forward

3.1 What will influence staple food prices over the next 10 years?

The two main groups of forecasters at FAO/OECD and USDA agree that staple food prices are expected to fall to some extent from recent levels in real terms over the next 10 years. They seem, however, set to stay at a higher level compared to before the price spike: expected to be some 20% to 70% above the levels seen in the mid-2000s.

Maize prices in 2021 are projected to be around US\$180 per tonne in constant 2005 terms, according to FAO/OECD, some 66% higher than 2004/06, see Figure 20. These projections have tended to rise over recent years, particularly for maize. Maize prices projected for 2017 in the 2012 Outlook were some 43% higher than those projected for 2017 in 2008.

Figure 20: Maize / Coarse Grains prices and price projections

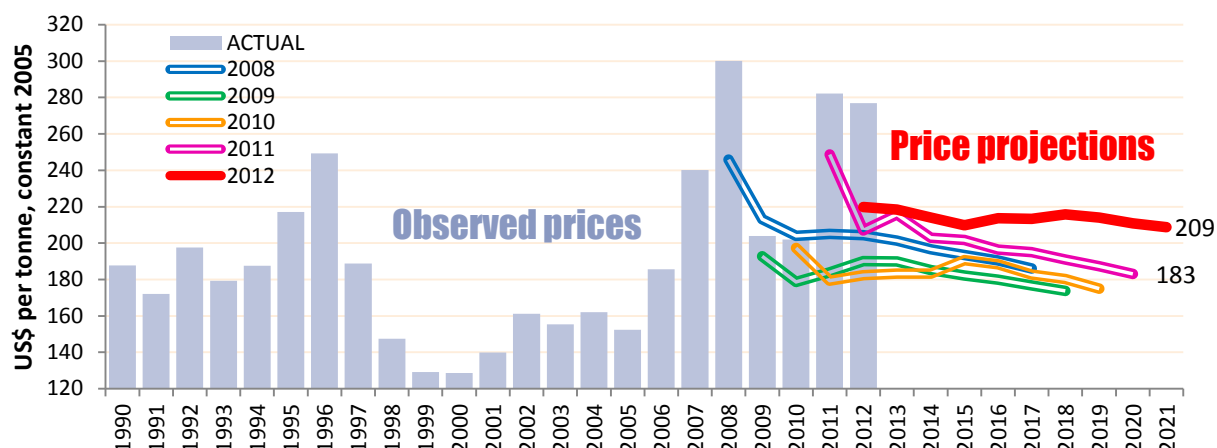


Source: Data from OECD/FAO Agricultural Outlooks (2008 to 2012) for projections. Annual average US No 2 yellow maize prices constructed from IMF commodities database.

Note: Prices deflated by the US Implicit price deflator.

Wheat prices for 2021, see Figure 21, are expected to be US\$209 a tonne, 25% more than in 2004/06. As for maize, projected prices, in real terms, have been raised with each passing year.

Figure 21: Wheat price projections from OECD/FAO Outlook

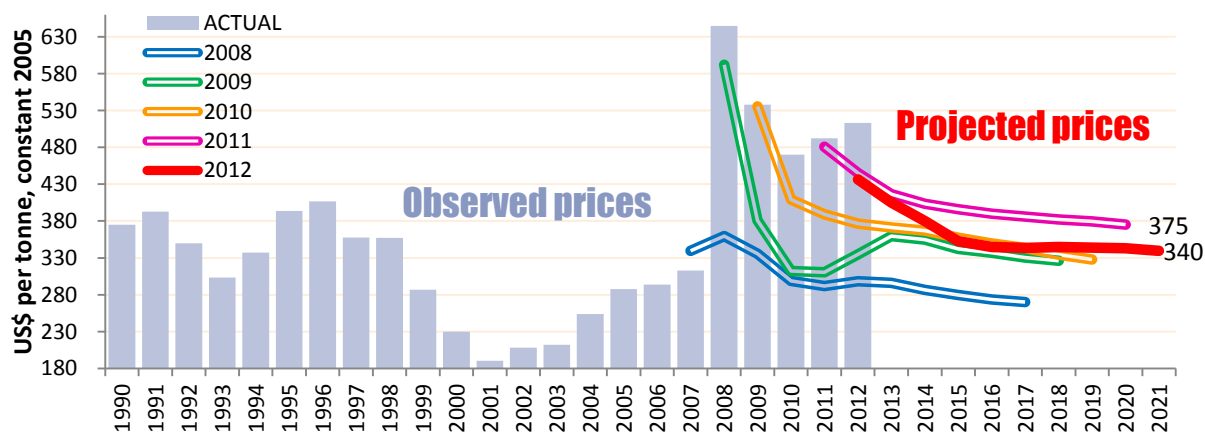


Source: With data from OECD/FAO Agricultural Outlooks (2008 to 2012) for projections. Annual average US HRW wheat prices constructed from IMF commodities database.

Note: Prices deflated by the US Implicit price deflator.

Rice prices in 2021, see Figure 22, are projected to be around US\$340 per tonne in constant 2005 terms; some 22% higher than in 2004/06. Projections in this case have fallen back in the last year.

Figure 22: Rice prices and price projections



Source: With data from OECD/FAO Agricultural Outlooks (2008 to 2012) for projections. Annual average Thai 5% B rice prices constructed from IMF commodities database.

Note: Prices deflated by the US Implicit price deflator.

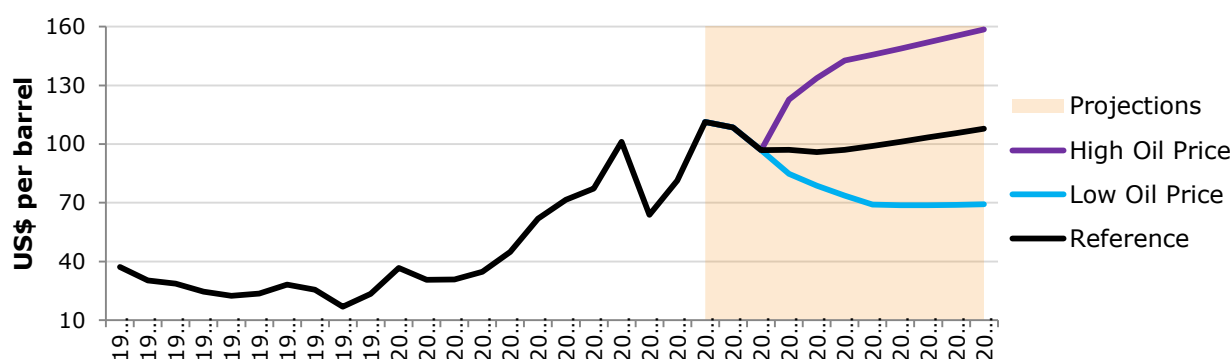
Nine uncertainties driving of food prices

Projections are only as good as the assumptions underlying them. Unfortunately there are at least nine significant uncertainties that apply to these projections. They can be divided amongst those affecting supply, demand, and both. Generally speaking, supply-side drivers are harder to predict than demand-side drivers.

Supply-side drivers of food prices

1. Oil prices are a major uncertainty – virtually unpredictable. While a number of organisations predict oil prices, projections vary within very wide bands. For instance the US Energy Information Administration (EIA) predicts prices between US\$70 and US\$160 a barrel by 2021 (See Figure 23).

Figure 23: Oil price projections from the US Energy Information Administration

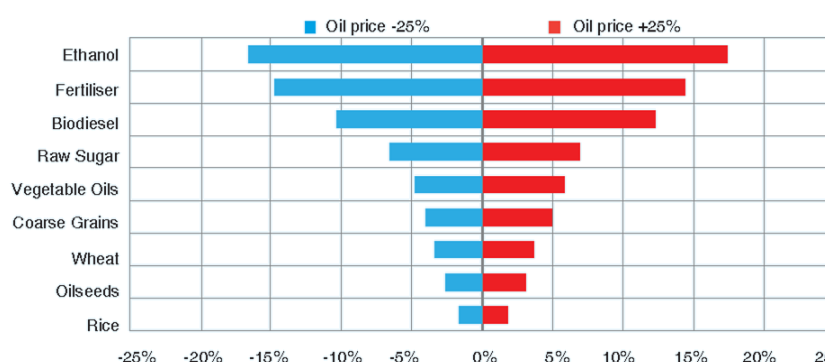


Source: Data from EIA http://www.eia.gov/forecasts/aeo/er/early_prices.cfm

Nonetheless, oil prices significantly affect the cost of production of cereals through machinery operations, nitrogenous fertiliser and transport costs. Figure 24 shows how sensitive models predicting prices are to changes in oil prices.

Increasingly, high oil prices also encourage production of biofuels — see below — so that energy and food markets are ever more closely linked.

Figure 24: Impact of a 25% increase/decrease in crude oil price on world commodity prices (average over projection period)

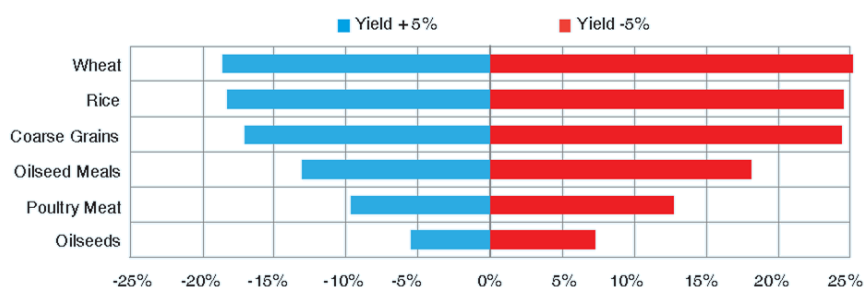


Source: From the FAO Outlook

2011: <http://www.oecd.org/site/oecd-faoagriculturaloutlook/48186214.pdf>

2. **Productivity changes** have to be estimated, involving judgments about farmer skills and technology improvements. Figure 25 shows the strong impact of yields on projected prices. Staple food projections are highly sensitive to these, FAO reckoning that every percentage point improvement in yields reduces prices by around 4%. Rates of improvements in yield growth have been slowing over the last twenty years, thus projections continue to see growth rates in yields slowing down. That may change, since higher prices are likely to encourage improved productivity: high prices may thus be the best cure for high prices.

Figure 25: Impact of a 5% increase/decrease in annual cereal yield on world commodity prices (average over projection period)



Source: From the FAO Outlook 2011: <http://www.oecd.org/site/oecd-faoagriculturaloutlook/48186214.pdf>

Which crops see more investments in yield and land allocation or expansion will influence prices in the medium-term.

International land deals were not mentioned by the specialists interviewed as likely to drive prices over the next 10 years. While by some estimates land deals cover large areas — the Land Matrix project¹⁵ contains details of 1,006 deals covering 70.2M hectares — these remain small relative to global agricultural land¹⁶. Of course, were this land to be much better or worse farmed than before this might affect output, but strong assumptions would be necessary to have a significant impact.

3. **Government policies** affect farmer decisions. For instance, governments which tend to interfere unpredictably in cereals markets when faced with price changes dampen incentives for farmers to invest and innovate. Export bans may hold down domestic prices, but they deter farm investment.

Policies can be difficult to predict and incorporate into projections. For instance, the effect on rice prices of uncertainties including the Thai government stockholding, India's export bans, the degree to which growing exporters like Vietnam or Burma/Myanmar might push rice production and exports, and how major importers like the Philippines might respond to price rises, are question marks.

4. **Environmental uncertainties** surround climate change and resource scarcity. Projections to 2021 do not explicitly take climate change into account. Although cropping patterns appear to be changing to adjust to perceived increased risk from climate change, these responses are not yet included in the models as they are too uncertain. More extreme weather however means more variable harvests by 2020 and this is likely to raise price variability.

Water and land scarcity are also expected to play a role. Much depends also on technical advances to overcome resource scarcity, see point 8.

Demand-side drivers of food prices

5. **Biofuels.** Policy uncertainty around biofuels, particularly in the United States, is considerable. Mandates and subsidies may have stimulated the remarkable increase in production in the US and Europe since the early 2000s, but are production increases nearing a plateau?

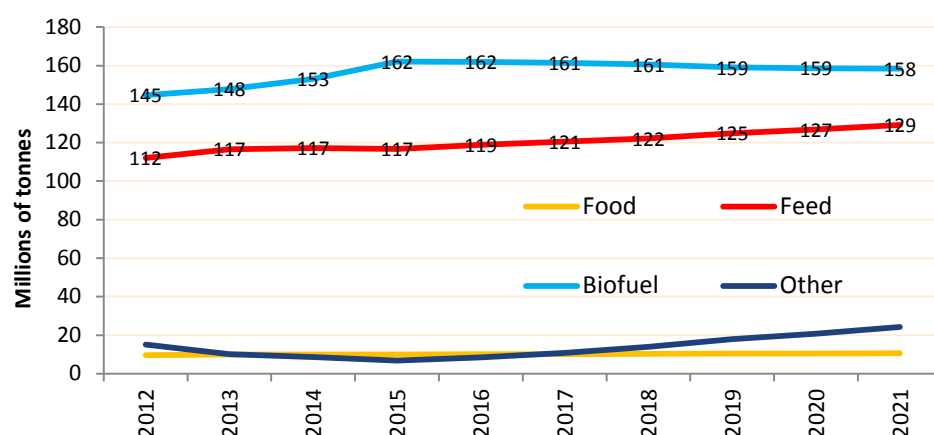
If it were policy alone, then the quantitative targets are close to being fulfilled. Capacity to absorb biofuel in the US is reaching the blending wall of tolerance of current engines for admixtures of ethanol to gasoline, at

¹⁵ See for instance Provost, 2012

¹⁶ Even the documented 70.2M hectares (likely an overestimate as it is not clear all of the documented deals came to pass) is equivalent to about 1.4% of global agricultural land in 2011 (FAOSTAT data), or about 4.5% of global land under arable and permanent crops in 2011.

most 15% ethanol. Figure 26 shows the latest projections for coarse grain uses by destination for the US, with biofuel use estimated to level off after 2015.

Figure 26: Uses of coarse grains in the USA – projections 2012 to 2021



Source: With data from OECD/FAO Agricultural Outlook 2012.

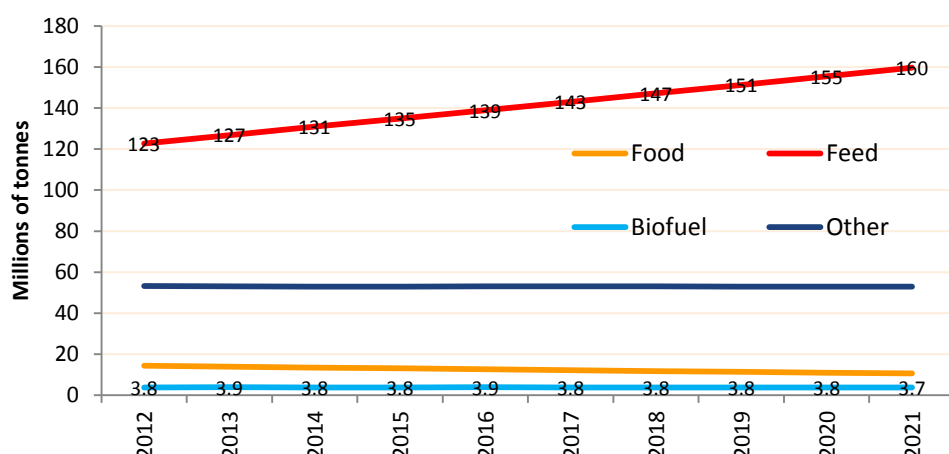
Note: 'Feed' use looks low (indeed in the statistics it appears to have fallen from around 156MT in 2004 to 114MT in 2012) but part of this is because some of the ethanol use by-products are returned to the feed use chain. Roughly one-third of every tonne of corn distilled to ethanol returns as livestock feed in the US as DDGS, replacing corn and soya meal, mostly for beef or dairy cattle (Hoffman & Baker, 2011). If 1/3 of biofuel use projected is added to feed projected uses, by 2021 the figure reaches some 182M tonnes

Oil prices, however, could drive production further. With high enough oil prices, economic incentives to produce biofuels could continue to ensure large and growing fractions of maize flowing into ethanol. Prices at US\$100 a barrel may however not be high enough to guarantee this. There is furthermore risk: if investors are not confident the oil price will remain at high levels — and the oil price is highly uncertain — investing in new plants may be too risky¹⁷.

An additional uncertainty is biofuel production in developing countries. If China were to convert grain to biofuels at even a considerably more restrained rate than the USA, this would put serious pressure on prices. China does not seem prepared to follow this route however. Though once they held ambitious plans for biofuels distilled from grains, in 2007 they announced a prohibition on expansion of existing ethanol plants and deemed any further biofuel expansion would have to come from alternative crops grown on marginal lands (Keats & Wiggins, 2011). Where China's coarse grain use continues to grow strongly is in animal feed, see point 6 and Figure 27.

¹⁷ According to one specialist interviewed, if it were possible to say for sure that oil prices might remain at US\$150/barrel for the next ten years, the right incentives would be there for people to build new plants; at the moment however the oil price situation is too uncertain.

Figure 27: Uses of coarse grains in China – projections 2012 – 2021



Source: With data from OECD/FAO Agricultural Outlook 2012

For some developing countries with abundant land, biofuels may be commercially attractive at oil prices of only US\$70 a barrel, provided that governments provide clear and consistent policy to allow investments in biofuels, including adjusting storage and vehicle engines to accommodate high blends of ethanol. Very large areas might be switched to biofuels in the tropics were oil prices to remain high and the policy framework to be in place. Brazil has shown that it can be done. Will other developing countries follow this lead?

6. Growth of developing (especially large Asian) economies. Population growth may be small, but incomes are rising and with them the demand for meat — see next point — and oil, that helps to support oil prices. The rising energy demand of China is one reason why oil prices have taken much longer to go down following the recent price spike compared to the spike in 1973/74. Many of the bigger countries in Africa have seen strong economic growth since 2005 of around 5% to 6% a year – which brings a higher demand for food as much additional income often goes to food when consumers have relatively low levels of consumption.

7. Demand for animal-source foods is strongly linked to the last point. Demand for feed grains depends heavily on the diets that increasingly affluent consumers in the South adopt. With more wealth, people demand more of high-value food, including fruit and vegetables, but also animal products like meat, milk, eggs and fish. Increasingly, animals are being raised in high intensity, commercialised systems, where they are fed large amounts of grain. In China, for example, demand for feed grains has risen strongly and steadily with economic growth. IFPRI analysis expects some 50% of the growth in cereal demand in the future will be to feed livestock rather than people. Much of the increased animal production will come from poultry, where feed conversion ratios are low¹⁸. Dairy is another area that looks set to grow.

That demand for livestock produce will rise is almost certain: what is less clear is by how much. Will developing economies follow the model of North America (more than 100 kg meat per cap a year), Europe (80 kg), or Japan (60 kg)? High consumption of animal foods, moreover, brings public health issues including obesity, heart disease, certain cancers, and diabetes: in the future governments may take action to limit levels of livestock intakes, but when and to what effect is imponderable.

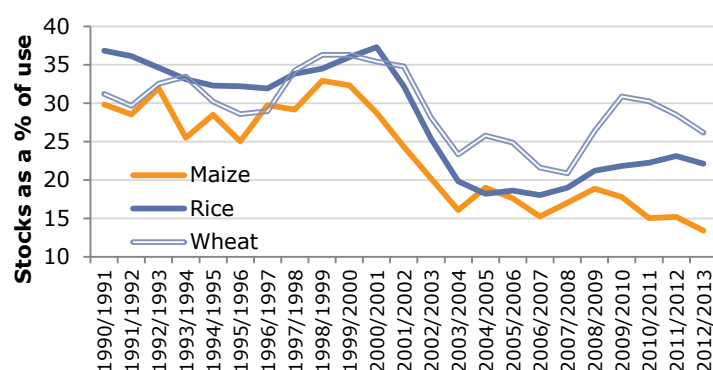
Drivers that influence both supply and demand

8. Global Stocks of cereals have fallen since the 1980s, see Figure 28, owing partly to public stocks being cut and partly to private stocks being drawn down during years when consumption exceeded production. Stocks

¹⁸ Poultry prices are projected to decline in real terms from 2012 to 2021 by 11% (over the same period beef prices are projected to decline in real terms by 7%; pork prices are projected to slightly increase in real terms from by 3% (Data from FAO/OECD Outlook 2012).

for maize are currently low and are not expected to be rebuilt by much for a year or two at least. Rice and wheat stocks are larger than those for maize, but relatively low compared to historical levels.

Figure 28: Stock to use ratios for maize, rice and wheat globally, 1990/91-2012/13



Source: With data from USDA FAS PSD, downloaded March 2013

9. **Technological progress** can affect prices through several channels. The oil price may fall if supply can be increased through improved fossil fuel extraction. Already fracking of natural gas may be relieving pressure on oil prices¹⁹. Alternative energy sources may replace fossil fuels, though this is more likely to affect oil prices in a future beyond this decade. Technical progress may produce second and even third generation biofuels²⁰ that are commercially viable, and perhaps drop-in fuels²¹ as well. When and if these breakthroughs may happen, however, is conjecture.

Technical advances should be made for agriculture; the more intriguing possibilities being those that address environmental limits — although the more ambitious plans, such as breeding cereals that can resist long dry spells in the growing season, may take a decade or more to perfect.

3.2 Discussion: future prices

Where does this leave us on future prices? For the more optimistic, given average weather and barring any unforeseen shocks, prices ought to trend downward in the near future, as increases in production in response to higher prices increase supply slightly ahead of demand. More pressure is expected on oilseed prices than staple cereals.

Prices are unlikely, however, to fall back to the historically low levels seen in the early 2000s. Higher costs of oil and hence fertiliser, a possible increasing cost of irrigation, mean that as supply increases, the marginal cost will probably rise. The higher the demands from animal feed and biofuel, the further supply will have to expand along a rising cost curve.

¹⁹ Though some believe the two prices will tend to be less strongly connected in the future, and there is a sense that while fracking can release considerable amounts in the short term, the increases in supply will not be sustained.

²⁰ Second generation means conversion of cellulose, third generation includes the actions of algae. One of the experts consulted memorably commented on the need to increase resources going to more innovative energy systems, instead of fermenting corn into alcohol as people have been doing for 10,000 years.

²¹ Enzymes can be used in laboratories and pilot plants to convert ethanol and biodiesel into alkanes and terpenes: near-perfect replicas of gasoline and diesel that could therefore be 'dropped in' to the existing fuel supply with no adaptation of engines or fuel storage necessary. Currently the challenge is to make these processes commercially viable.

Rising incomes in the developing world tend to make demand for staple foods less elastic, thereby amplifying price rises in response to supply shocks. Biofuel mandates also reduce flexibility of demand. On the other hand, increasing integration of markets across the world will tend to reduce the overall variance in cereals harvests. Technological advances could push prices either way: down if through improved productivity; up if encouraging stronger demand for ethanol for instance via drop-in fuels.

Projections, however, are based on models that cannot easily handle shocks. By their nature, shocks tend to be unpredictable. Experienced analysts comment that the shocks which change prices most dramatically are the least predictable: for example, the sudden demand for additional grains by the Soviet Union in 1973, the Asian Financial Crisis, the outbreak of mad cow disease, the breakup of the Soviet Bloc and rare, one in 50 year weather extremes such as the drought that hit the Midwest in 2012. The surge in biofuels demand from 2004/05 was as strong as it too was unexpected.²² Climate change above all else may make extreme conditions more common.

The implication of shocks is to build more resilience into the system. But that involves some difficult judgments about how strong and frequent future surprises may be. If 2007/08 was a perfect storm, unlikely to be repeated more often than one in 30 years, then how much priority should be given to preventing that rare event, when there are so many other things that might be done with resources in the meantime? At the margin, the food price shock was unwelcome, but it was hardly a catastrophe when compared to other shocks that arise, such as earthquakes.

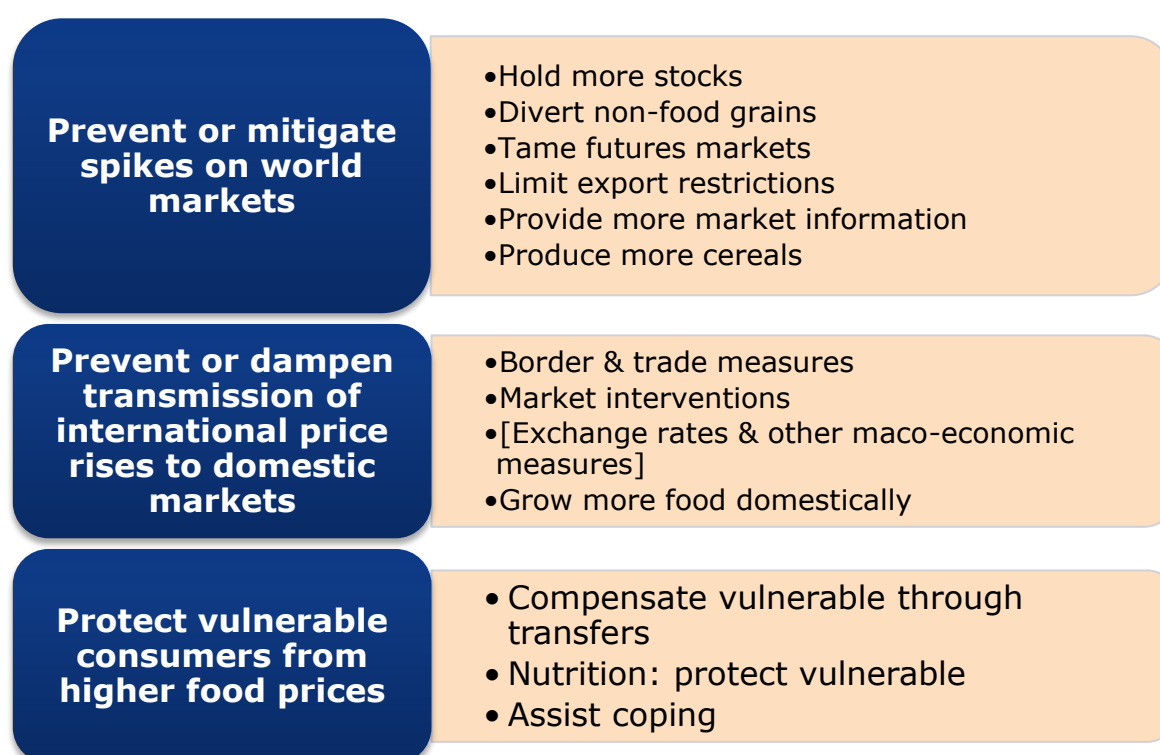
²² One expert interviewed compared the US maize ethanol situation in 2005 to a rake in the grass, waiting to be stepped on.

4 Policy implications

Policy concerns arising from the food price spike can be divided into international and domestic policies. The former policies aim to stabilise international prices, and if possible, to bring down their levels. The latter concern domestic price levels and volatility, and protecting the vulnerable from high and variable food staple prices. Figure 29 outlines the main options.

This section looks at how thinking about options has evolved, focusing on emerging insights. It also assesses information needs to allow timely analysis of emerging trends that will affect food prices in the future. It does not set out all the arguments for and against the various options, with supporting evidence: these were reviewed in 2010 by ourselves (Wiggins et al. 2010), as well as by several others, most notably HLPE (2011).

Figure 29: Options for responding to food price spikes and their consequences



Source: Adapted from Wiggins et al. June 2010

4.1 International concerns

Early thinking in 2008 about averting food price spikes looked first at *increased public stocks*, with good reason: had stock-to-use ratios been higher in 2007, then the spike would most probably not have happened. The shocks to supply and demand would have been contained by release of stocks. Hence there were calls for public stocks to be held either globally, regionally and by countries. There were also quite specific proposals for stocks to be held for humanitarian use, to ensure that WFP and other agencies could obtain cereals during a price spike at reasonable cost.

While stocks would be effective, the cost of holding them might be high — perhaps US\$1 billion a year to hold another 70M tonnes in international stocks (Wiggins et al. 2010). More problematic would be their

governance. Who would pay, who would operate them and by what rules? Added to that are fears that a global stock would hang over the market deterring private storage and leading traders to second-guess the behaviour of the public stock managers, rather than focusing on supply and demand. A final consideration is how large the stocks would have to be to pass the threshold that stabilises the system: since an exact figure is not known, the dangers are that too much or too little might be held. The High Level Panel of Experts (HLPE 2011) are therefore considerably restrained in recommending public stocks, even if they can see that in principle it might be attractive. For these reasons, international meetings such as the G8 and G20 have not proposed increased public stocks, other than small humanitarian reserves.

Several observers (McCreary 2010, Wright & Cafiero 2010, Galtier 2012) have suggested that the main grain exporting countries be obliged to hold a fraction of their annual average exports as public stocks, that could compensate for harvest shortfalls and demand surges. This has the virtue of only applying to a limited number of countries since the five main exporters provide around 90% of maize, 80% of rice, and 70% of wheat traded. Governance might be simpler since it might be expected that the public stock holders would co-ordinate with private exporters in their countries. The drawback, of course, is that the cost falls on exporting countries which are the least likely to suffer from a price spike: on the contrary they may make windfall gains. So why would they agree to this? Moreover, some of the grain exporters showed their colours in 2008 when they restricted exports during the spike, rather than enhanced them.

Diversion of grains from animal feed and industrial use to food channels during times when spikes threaten could potentially head off a spike (McCreary 2010, Wright & Cafiero 2010). It has the advantage of not requiring annual investments as stocks do. As an international scheme, however, governance looks near impossible: it is hard to imagine OECD countries taking measures to restrict their animal feed operations and hence reduce meat supply, so as to reduce price pressures that principally benefit people in distant lands. This may be an option for some middle income countries that have sufficiently large grain-fed livestock feeding that some reduction in volume might allow additional supplies to domestic food markets. The problem here is that this would need to be combined with restrictions on trade, otherwise the additional grains would flow out in search of the high international prices (Locke et al. 2013).

The role of *index investment* ('speculation') in the price spike has seen the most heated disputes among analysts. The balance of evidence may be that this was a minor contributor to the spike, if it contributed at all; yet that has not prevented many in civil society arguing that this kind of investment on futures markets should be limited and controlled. Some of those who see controls as beneficial have taken the position that even if it cannot be proved that index investment was a problem, the precautionary principle might be applied (HLPE 2011, Spratt 2013). That assumes that there are no possible benefits from index investment so that limiting this would see no losses, other than the fast profits that might be taken from playing the markets.²³ In practice the US has introduced some controls on trading on the commodities futures; although there seems little appetite amongst governments in the US or elsewhere for anything more than these.

The challenge of *biofuels*, already a major consumer of maize in the US, has attracted much concern. At very least, argue HLPE 2011 and Wright 2011, biofuel mandates should be flexible, to be relaxed at times of pressure on grain prices. Subsidies for biofuels need reconsideration. In spite of strong arguments, the US government and the EC seem reluctant to go back on their policies. These stimulated considerable investments in processing plants, so there is now an equally determined lobby from those who invested for the policies to remain. Even when the worst drought in living memory in the Midwest led to a failure of the 2012 US maize harvest and hence to soaring prices for maize, the US EPA refused to consider waiving mandatory goals for ethanol production.

Worrying as this may be, it may be the least of our concerns if oil prices remain high or increase so making commercial production of biofuels in the tropics profitable. The future price of oil and the feasibility of a much expanded biofuel industry in developing countries, however, are considerable imponderables.

²³ Yet some say the problem with index investment is that it does not play the markets, but instead follows formulaic management that looks to realise gains in the longer run.

At the time of the spike there were many calls for *disciplines on export restrictions*, repeated in more recent assessments (HLPE 2011). No cereals exporter, especially those for whom domestic prices of grains are politically sensitive since they have many low income consumers buying staples²⁴, however, can reassure the rest of the world that when spikes threaten they will not restrict exports.

Nevertheless, the turmoil on rice markets in Asia that ensued in late 2007 as some countries overstocked while others stopped their exports has not been repeated. Whether that is because the circumstances that provoked those policies have not been repeated, or whether governments in the region have agreed — albeit informally — not to take actions that might precipitate a replay of events in early 2008, is not known. More likely is that governments have taken measures, such as increasing stocks and domestic production, that make them less vulnerable to external events.

One point of agreement in international meetings has been that having more accurate and detailed *information on the state of food markets* publicly available should benefit almost everyone, from international organisations to governments to private traders. FAO has thus been mandated to set up an improved Agricultural Market Information System (AMIS) which it is currently developing.

The other point that is also widely agreed is that *accelerating the growth rate of cereals*, especially in countries vulnerable to price spikes, would ease pressure on markets. In addition, production by smallholders in developing countries could also contribute to reducing rural poverty and hunger. Hence there have been repeated calls for stimulating production, backed by increased aid for agriculture. As Figure 1.11 shows, whether through public investments or by private reaction to higher prices, there has been such an acceleration.

Some calls have been made to moderate rising demand for grains, other than from biofuels, by reducing the amount of *food that is wasted* — thought to be one third or more, in OECD countries mainly by consumers, and between field and market in the developing world. Other than pointing out the apparently large amounts that might be saved, and the technical means for cutting out waste, there have been no concrete proposals for this yet.

More politically difficult is the question of *meat consumption* and the likely patterns of diet that might emerge in growing economies in the near future, and their implications for cereals demand.

4.2 Domestic concerns

Stabilising prices

The food price spike has moderated the previous conventional wisdom that domestic price stabilisation is costly, difficult and likely to be either ineffective or counter-productive. Abbot's (2010) review of price stabilisation restates the arguments, but admits that while the world market usually helps to stabilise domestic markets — since prices on domestic markets are likely to be more volatile than those on world markets — in times of price spikes this may not be so. Hence there is a case for additional, precautionary measures domestically to guard against such events. For the Middle East and North Africa countries that, owing to their large cereals imports, have been particularly vulnerable to rising world prices, Wright & Cafiero (2010) argue that stocks may be better way to guard against domestic instability than increased domestic self-sufficiency in cereals, given the likely costs of additional production in lands short of irrigation water.

More radical reassessments include that from Gérard et al. (2010) representing a coalition of French economists. They argue that for too long public instruments to stabilise prices — by controlling production through input subsidies, regulating imports and exports through variable taxes and subsidies, quotas, bans,

²⁴ In high income countries grain prices transmit weakly to retail prices, since most staples are consumed in processed form — wheat becomes bread or pasta for example, where the raw material represents no more than a tenth of the retail price. Typically a doubling grain prices adds no more than 10% to the price on the shelf.

and using public stocks — have been ignored in favour of market-based instruments such as warehouse receipts, insurance, and futures contracts. The public role has been restricted to social protection. The balance, they argue, needs to be restored: public instruments should be reconsidered. Wahenga (2010) are also sceptical about the ability of market instruments to deal with cereals price volatility in Southern Africa.

Based on the experience of Southeast Asia, Dawe & Timmer (2012) argue that stable domestic prices for staples have been part of the successful development strategies of countries in the region, with benefits not just for vulnerable consumers but also for industrialists concerned over living (or 'efficiency') wages. Tantalisingly they report that countries such as Indonesia and Thailand were able to stabilise their cereals prices by public control of as little as 5% of the total volume of grain: leaving most of trading in private hands and thereby avoiding the sort of rigidities and costs associated with heavy public intervention in markets.

Much of this discussion assumes countries have the funds and administrative capacity that middle income countries have. For most low income countries (LICs), however, the options may be considerably more limited for lack of these conditions. Consequently de Janvry & Sadoulet (2011) see increasing domestic production as the most feasible option for LIC, especially given that they usually have under-used land and labour.

Social protection

With respect to protecting the vulnerable against the effects of price spikes, the main lesson learned is that of having systems in place that can be expanded, adapted and deepened to accommodate increased needs and perhaps larger numbers in need. It is more or less impossible to create functioning systems within the weeks and months of a price spike.

Once again, there is a marked contrast between middle income countries that often do have safety nets in place, and most low income countries that do not.

4.3 Timely analysis for the future development of prices

What developments need to be tracked to have timely information and analysis of the likely evolution of food prices, making it less likely that unpleasant surprises such as the 2007/08 price spike will catch most observers off guard? Five concerns can be picked out, as follows, roughly in order of priority or by their importance in the near future:

Stocks of cereals. Better information on stocks would alert both traders and governments to conditions that threaten to produce price spikes. Price spikes hardly ever happen without low stock-to-use ratios. Hence having more accurate information on the state of stocks is information well worth having. It is true that gathering such information to any degree of accuracy is not straightforward: but the bulk of the world's grain stocks are held in no more than a dozen territories²⁵, so by concentrating attention on getting better estimates for those countries, significant improvements on current estimates may well be possible. Currently only two countries probably have reasonably reliable data on the stocks held in their jurisdiction: India and the US. If this can be done in these two cases, why not elsewhere?

It is not just a question of collecting and documenting the statistics. The importance of stock levels needs to be impressed upon leaders. The exact thresholds necessary to allow most shocks to be offset by stocks may not be known, but specialists can readily identify the ranges in which stocks are probably enough, marginal, and insufficient: green, amber and red conditions.

The AMIS initiative at FAO is addressing this issue: see, for example, Bobenreith et al. 2012.

Oil prices, biofuels production, policy and investment. Oil prices affect food prices directly, but their influence on food prices could become huge if oil prices remain above US\$100 a barrel and are expected to stay there.

²⁵ Around 87% of maize, 80% of rice and 75% of wheat stocks are in each case held in the ten countries with the largest holdings.

At these prices, biofuels produced from tropical feedstock such as sugar cane, palm oil, cassava and sweet sorghum should be cheaper than gasoline/petrol and diesel. Given the amounts of transport fuels used, the demand for land for biofuel feedstock could become very large indeed: 100M hectares and counting. It seems that only two things stand between the underlying economics and commercial reality.

One is the risk that oil prices may only temporarily be perched at their current high levels, so that, as has happened several times before, high prices will stimulate more exploration and technical breakthroughs in fossil fuel extraction, so that within a few years the price will be brought down sharply.

The other is that many developing countries with high costs for imported fossil fuels have neither the clarity of policy on their transport fuels, nor the immediate means and will to make the heavy investments in storage, distribution and modifications to the vehicle fleet necessary to move to a transport system powered largely by biofuels. Brazil has done this, so it is possible. But there were costs and arguably the Brazilian biofuel industry took at least a decade to create. Will other developing countries — and perhaps some OECD countries as well — follow the path that Brazil has taken?

Added to this is the unknown of when and if second and third generation biofuels, and perhaps drop-in fuels, will become commercially viable.

These elements need monitoring, with regular reviews of developments and their implications for food prices. It would be unfortunate were large-scale biofuel industries to emerge in the tropics under the radar of international leadership.

Changing diets and their implications for the demand for animal feed. As incomes rise in Asia and more of the population becomes urban, diets will change. Fewer staples per capita will be consumed; more oil and fat, sugar, fruit, vegetables, dairy, meat and fish will take their place. That is clear. What is less obvious is just how much this will take place and the detail of the substitutions likely. Will diets in the developing world move towards the patterns seen in North America and Northern Europe, with large intakes of livestock produce? Or might they evolve towards regional patterns, reflecting local preferences? Japan, for example, has a diet much lower in oils, fats and farmed livestock produce than North America, although higher in seafoods.

The implications of dietary evolution will make a significant impact on the prices of staples through demand for feed grains including soybeans. Diets will not evolve purely by local consumer preference. It is increasingly likely that governments recognising the medical evidence of the costs of diets rich in fats, sugar and salt may intervene to steer their national diets towards healthier alternatives that will mean less consumption of meat and animal fats and possibly high-fat dairy produce as well. Both the evolution of diets and public policy for diet need to be monitored and their implications assessed for agriculture.

In the longer term, two other issues need to be kept under review.

Climate change, more variable weather, emerging patterns for harvests. It is likely that changes to weather patterns and variability will become increasingly apparent this decade and come thereafter ever more strongly to influence agricultural production. Information on the changes, their impacts on agriculture, on adaptation by farmers and technical progress that assists adaptation will be needed.

Challenges of sustainable and low net emission agriculture. Agriculture will have to become sustainable over the next two decades; above all in making economical use of irrigation water, limiting use of external inputs such as fertiliser and crop chemicals, reducing soil erosion and degradation, restricting conversion of valued habitats such as tropical forests, peat and wetlands to new fields and pastures, and capturing carbon within farming systems. Changes to farming systems as well as the drivers of these changes in technical advances, changes in factor prices reflecting scarcity and policies will need to be tracked. Trade-offs between production and conservation objectives need to be monitored.

4.4 Discussion: wider perspectives

Turning old problems into opportunities

The food price spike has not just led to thinking about how to avoid such spikes or mitigate their consequences. It has also directed attention towards two longstanding issues. One has been the disappointing rates of agricultural growth in some countries and especially those of Sub-Saharan Africa. A revival of interest in agriculture was already underway, for Africa most significantly marked by the Maputo Declaration of 2003 that saw African ministers of agriculture commit to redoubled efforts to raise agricultural growth rates. Those commitments, linked to the Comprehensive Africa Agricultural Development Programme (CAADP), and backed up by initiatives such as the Alliance for Green Revolution in Africa (AGRA), were seen as prescient and lent urgency when international cereals prices spiked.

The other has been child malnutrition. Before the spike there was already concern that progress towards meeting the food security and nutrition targets of the first Millennium Development Goal was lagging, especially in Africa and South Asia. Early assessments that the spike had increased the number of undernourished to around one billion persons thus came as a rude shock. Since 2007 there have been several new international initiatives to combat child malnutrition such as the Scaling Up Nutrition (SUN) framework and the Thousand Days initiative for child nutrition that joined existing programmes such as the Global Alliance for Improved Nutrition (GAIN) that began in 2002. Many donors have revised and revitalised their programmes for food and nutrition security. The High Level Task Force set up by the UN Secretary General to address the issues of high food prices has steered its work towards this issue.

In both cases, the food price spike has directed attention to areas of disappointment, but in the process has reminded leaders that while progress has been inadequate, there is nothing that difficult or complicated about raising food production or reducing child malnutrition. Many of the necessary actions are well-known and proven: all they need is funding and political backing. In this sense, they are easy wins. If the result of the food prices spike is to accelerate progress on these two fronts, then a problem will have been turned into an opportunity.

What is more, the evidence now emerging on increased food production and progress on reducing child malnutrition — see Figures 1.11 and 1.16 — suggests that the opportunities created are being seized. Quite apart from the intrinsic value of these gains, this should remind leaders that when determined action is taken, changes can be made — even in areas previously seen as ‘difficult’. They were only ‘difficult’, it would appear, because before they got too little political support and inadequate investment.

Monitoring changes in welfare and key contributory factors

Five years after the spike some things have become clearer, but other things are maddeningly still not understood. Information on prices and several of the proximate causes of the crisis may be available; but the factors that transmit this through to outcomes in incomes, poverty and food and nutrition security are simply not monitored as closely as they need to be. The single largest gap in readily available sources concerns changes in employment and wages in rural areas: did the higher prices stimulate farmers to hire more labour? Did farmers earn more and spend this locally thereby creating additional activity with more jobs and better wages? There seems to be next to no information on this.

Some progress is apparent in nutrition monitoring. Before 2007, there were many countries where a decade could pass without a nationally representative survey of child nutrition. Now it seems that nutrition surveys are being carried out more frequently across more countries. This allows statistics such as those in Figure 19 to be compiled. Granted these statistics prompt a host of questions, but they look as if they will produce some interesting and morale-boosting answers for those engaged in reducing malnutrition. There are furthermore large gaps in monitoring of micro-nutrition status, including measures of sufficiency in vitamins and minerals such as Iron, vitamin A, Zinc, and Iodine.

In an age where mobile phones are now commonplace even in remote rural areas, why are there not more systems that report simple statistics such as the going rate for unskilled labour and the cost of a bag of the

local staple food — data that should be readily apparent to informed locals? Sentinel reporters in key locations could text in the information, rewarded by phone credits for their efforts, with a small number of supervisors to check that the data being submitted are reliable. Texted data could quickly be compiled, tabulated, mapped and graphed at national level to give an accurate, up-to-date and detailed picture of the evolution of such key indicators.

Reacting to shocks

Finally, two perspectives emerge from the review of impacts. One is an approach to policy-making that monitors shocks and the distress that results and seeks to compensate vulnerable people who may lose out. This is the natural territory of social protection, of humanitarian action. Most thinking about the price spike has understandably been from this perspective.

But there is another view that emerges, one that comes from looking at change in the round and over a slightly longer period. The statistics being reported through this lens are startlingly different to those that come from detailed local surveys in the short run. To our great relief, it would seem that whatever the price spike did in the majority of countries, it has not condemned a generation of infants to malnutrition. Admitted that without a counterfactual we do not know to what degree progress has been slowed by higher prices, but what is evident is that only in a minority of cases has there been a regression. Furthermore the opinion polls reported by Headey (2011) and others backs this up, reminding that those fortunate enough to live in a thriving economy with reasonably broad-based growth and a government competent in providing public goods, services and some social protection, the price spike may have been unwelcome but was hardly a disaster.

What then is the priority for public action? Yes, vulnerable people need protection. But the wider goals of broad-based economic growth and accompanying improvements in public goods and services need to be emphasised, since the evidence suggests that where progress on these are made, the impacts of price shocks can be considerably buffered.

Those living in low income countries with without strong growth and an able government need support to allow more resilience at household and community level — where most coping has taken place. This support will vary by circumstances, but potential foci for action include security; respect for rights of local people to and, water, grazing and forests; provision of key services such as health care; and providing passable road access.

References & bibliography

- Abbott, Philip & Adeline Borot de Battisti, 2009, 'Recent Global Food Price Shocks: Causes, Consequences and Lessons for African Governments and Donors', Paper, International Agricultural Trade Research Consortium Analytic Symposium "Confronting Food Price Inflation: Implications for Agricultural Trade and Policies", June 22-23, 2009, Seattle, Washington
- Abbott, Philip C., Christopher Hurt & Wallace E. Tyner, 2008, 'What's driving food prices?', Report for the Farm Foundation, July 2008, Oak Brook, Illinois
- Abbott, Philip, 2010, Stabilization Policy in Developing Countries after the 2007-08 Food Crisis, Draft Paper for OECD, February, 2010
- Arora, Abhimanyu; Jo Swinnen & Marijke Verpoorten, 2012. Self-Reported Food Insecurity in Africa During the Food Price Crisis. Selected Paper prepared for presentation at the International Association of Agricultural Economists (IAAE) Triennial Conference, Foz do Iguaçu, Brazil, 18-24 August, 2012. <http://ageconsearch.umn.edu/bitstream/126897/2/Arora.pdf>
- Auerlich, Nicole, Scott H. Irwin, and Philip Garcia, 2012, 'Bubbles, Food Prices, and Speculation: Evidence from the CFTC's Daily Large Trader Data Files, Paper, NBER Conference on "Economics of Food Price Volatility" in Seattle, WA, August 15-16, 2012
- Balagtas, Joseph V.; Humnath Bhandari; Samarendu Mohanty; Ellanie Cabrera; & Mahabub Hossain. 2012 Impact of a Commodity Price Spike on Poverty Dynamics: Evidence from a Panel of Rural Households in Bangladesh. Contributed paper prepared for presentation at the 56th AARES annual conference, Fremantle, Western Australia, February 7-10, 2012.
- Bento de Souza Ferreira Filho, Joaquim & Carlos Eduardo de Freitas Vian, 2012, 'Food security in Brazil and policy responses to the 2007/2008 price swings', Paper to 28th International Conference of Agricultural Economists [ICAE], 19 to 24 August 2012, Foz do Iguaçu, Brazil
- Bobenrieth, Eugenio, Brian Wright & Di Zeng, 2012, 'Stocks-to-use ratios as indicators of vulnerability to spikes in global cereal markets', Paper, 2nd Session of the AMIS, Global Food Market Information Group, Rome: FAO, 3 October 2012
- Brinkman, Henk-Jan; Saskia de Pee; Issa Sanogo; Ludovic Subran; and Martin W. Bloem, 2010. High Food Prices and the Global Financial Crisis Have Reduced Access to Nutritious Food and Worsened Nutritional Status and Health. The Journal of Nutrition Supplement: The Impact of Climate Change, the Economic Crisis, and the Increase in Food Prices on Malnutrition. <http://jn.nutrition.org/content/140/1/153S.full.pdf>
- Brown, M. E., F. Tondel, T. Essam, J.A. Thorne, B.F. Mann, K. Leonard, B. Stabler & G. Eilerts, 2012, 'Country and regional staple food price indices for improved identification of food insecurity', Global Environmental Change, <http://dx.doi.org/10.1016/j.gloenvcha.2012.03.005>
- Carrasco, Bruno & Hiranya Mukhopadhyay, 2012, 'Food Price Escalation in South Asia—A Serious and Growing Concern', ADB South Asia Working Paper Series No. 10 February 2012, Manila: Asian Development Bank
- Chowdhury, Anis, 2011, 'Food Price Hikes: How Much Is Due to Excessive Speculation?', Economic & Political Weekly, 46 (28), 12-15
- Collins, Keith, The Role of Biofuels and Other Factors in Increasing Farm and Food Prices. A Review of Recent Developments with a Focus on Feed Grain Markets and Market Prospects, Paper, June 19, 2008
- Compton, Julia; Steve Wiggins & Sharada Keats, 2010. Impact of the global food crisis on the poor: what is the evidence? ODI Report.
- David L. Tschirley & T.S. Jayne, 2010, 'Exploring the Logic Behind Southern Africa's Food Crises', World Development, 36 (1), 76-87
- Dawe, David & C. Peter Timmer, 2012, 'Why stable food prices are a good thing: Lessons from stabilizing rice prices in Asia', Global Food Security, <http://dx.doi.org/10.1016/j.gfs.2012.09.001>
- de Janvry, Alain & Elisabeth Sadoulet (2011): Subsistence farming as a safety net for food-price shocks, Development in Practice, 21:4-5, 472-480
- Dev, S. Mahendra, Jan 2011. Rising Food Crisis and Financial Crisis in India: Impact on Women and Children and Ways of Tackling the Problem. Indira Gandhi Institute of Development Research, Mumbai.
- Djuric, Ivan; Linde Gotz & Thomas Glauben, 2012. Global commodity price peaks and governmental interventions: The case of the wheat-to-bread supply chain in Serbia - Who benefited and who lost? Poster prepared for presentation at the Agricultural & Applied Economics Association's 2012 AAEA Annual Meeting, Seattle, Washington, August 12-14, 2012. <http://ageconsearch.umn.edu/bitstream/125142/2/DjuricGotzGlauben.pdf>

- Dorward, Andrew, 2012, 'Agricultural labour productivity and food prices: fundamental development impacts and indicators', Working Paper, Centre for Development Environment and Policy, School of Oriental and African Studies, University of London, March 2012
- D'Souza, Anna & Dean Jolliffe, April 2012. Food Security and Wheat Prices in Afghanistan: A Distribution-sensitive Analysis of Household-level Impacts. Policy Research Working Paper 6024, The World Bank South Asia Region
- D'Souza, Anna & Dean Jolliffe. Nov 2010. Rising Food Prices and Coping Strategies: Household-level Evidence from Afghanistan. Policy Research Working Paper 5466. The World Bank, South Asia Region
- EIA, March 6, 2012. Record U.S. ethanol exports in 2011 help offset Brazil's production decline. <http://www.eia.gov/todayinenergy/detail.cfm?id=5270>
- Eicher, Carl, 2003, 'Flashback: Fifty Years of Donor Aid to African Agriculture', Conference Paper No. 16, revised version of a paper presented at the InWEnt, IFPRI, NEPAD, CTA conference "Successes in African Agriculture", Pretoria December 1-3, 2003
- FAO Regional Office for Africa, 2011. Effectiveness of Policy Responses to the 2008 Food Crisis: Evidence from Five Countries in West Africa. FAO-RAF. Policy Brief. <http://www.fao.org/docrep/015/an172e/an172e00.pdf>
- Farrington, John, N. C. Saxena, Tamsyn Barton & Radhika Nayak, 2003, 'Post offices, pensions and computers: new opportunities for combining growth and social protection in weakly integrated areas?', Natural Resources Perspectives, Number 87 June 2003, Overseas Development Institute, London
- FEWS NET – Famine Early Warning Systems Network (2008) 'Ethiopia Food Security Update', October 2008, Addis Ababa and Washington DC
- Filipski, Mateusz & Katia Covarrubias, 2012. Distributional Impacts of Commodity Prices in Developing Countries, in ed. Brooks, Jonathan, 2012 Agricultural Policies for Poverty Reduction. OECD <http://cdi.mecon.gov.ar/docelec/OECD/libros/64.pdf#page=63>
- Friedman, Jed; Seo Yeon Hong; & Xiaohui Hou, Nov 2011. The impact of the food price crisis on consumption and caloric availability in Pakistan: Evidence from Repeated Cross-sectional and Panel Data. HNP Discussion Paper 66305 http://www-wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2012/01/16/000386194_20120116004010/Rendered/PDF/663050WP00PUBL0B0FoodPriceCrisisPAK.pdf
- Fuglie, Keith O., 2010, 'Total Factor Productivity in the Global Agricultural Economy: Evidence from FAO Data', in Alston, Julian, Julian M., Bruce A. Babcock, & Philip G. Pardey (Eds), 2010, The Shifting Patterns of Agricultural Production and Productivity Worldwide, Ames, Iowa: The Midwest Agribusiness Trade Research and Information Center, Iowa State University
- Galtier, Franck, Lamissa Diakité (IER) et Salif Diarra (OMA), 2009, 'Efficacité des politiques de stabilisation des prix alimentaires en Afrique Sub-saharienne : le cas du Mali', Note, Résumé exécutif de l'étude, Novembre 2009
- Galtier, Franck, 2012. Export Bans and Grain Price Instability on International Markets. CIRAD. Global Commodities Forum, Palais des Nations, Geneva 23 - 24 January 2012
- Gérard F., Alpha A., Beaujeu R., Boussard J.M., Levard L., Maître d'Hotel E., Rouille d'Orfeuil H., Bricas N., Daviron B. & Galtier F., 2010, 'Managing Food Price Volatility for Food Security and Development', Draft Summary, GREMA, France
- Ghosh, Jayati, 2010, 'The Unnatural Coupling: Food and Global Finance', Journal of Agrarian Change, 10 (1), 72–86
- Gibson, John & Bonggeun Kim, 2012. Quality, Quantity, and Nutritional Impacts of Rice Price Changes in Vietnam. World Development. <ftp://mngt.waikato.ac.nz/RePEc/wai/econwp/1116.pdf>
- Gilbert, Christopher L., 2008, How to understand high food prices, Paper prepared for conference, 'The Food crisis of 2008: lessons for the future', Wye College, 28 October 2008, Revised Version 17 November 2008
- Gilbert, Christopher L., 2010, 'Speculative influences on commodity futures prices 2006–2008', UNCTAD Discussion Papers No. 197, Geneva: UNCTAD
- Grosh, Margaret; Colin Andrews; Rodrigo Quintana & Claudia Rodriguez-Alas, Sep 2011. Assessing Safety Net Readiness in Response to Food Price Volatility. World Bank SP Discussion Paper No. 1118. http://www-wds.worldbank.org/servlet/WDSPContentServer/WDSP/IB/2011/09/23/000333038_20110923032445/Rendered/PDF/646320NW011180BOX361542B000PUBLIC0.pdf
- Headey, Derek & Shenggen Fan, 2010, 'Reflections on the global food crisis. How did it happen? How has it hurt? and How can we prevent the next one?' IFPRI research monograph 165. Washington DC: International Food Policy Research Institute
- Headey, Derek D., 2010, 'Rethinking the Global Food Crisis. The Role of Trade Shocks', IFPRI Discussion Paper 00958, March 2010. Washington DC: IFPRI

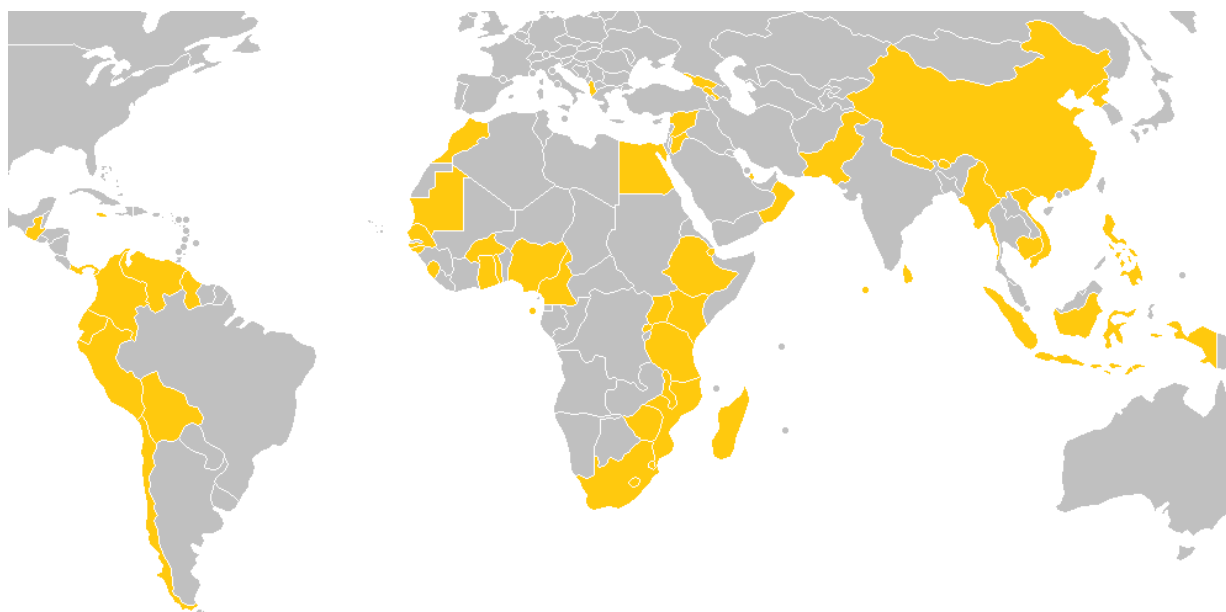
- Headey, Derek, 2011, Was the Global Food Crisis Really a Crisis? Simulations versus Self-Reporting, IFPRI Discussion Paper 01087, May 2011, Washington DC: International Food Policy Research Institute
- Headey, Derek; Fantu Bachewe Nisrane; Ibrahim Worku; Mekdim Dereje; & Alemayehu Seyoum Taffesse, 2012. Urban wage behavior and food price inflation: The case of Ethiopia. IFPRI ESSP II Working Paper 41
- Hella, Joseph P.; Ruth Haug & Illuminatus M. Kamile, 2011. High global food prices - crisis or opportunity for smallholder farmers in Tanzania, Vol 21, Issue 4-5, 2011.
- Heltberg, Rasmus; Naomi Hossain & Anna Reva, Eds. 2012. Living through Crises : How the Food, Fuel, and Financial Shocks Affect the Poor. Washington, DC: World Bank.
- Hertel, Thomas W., Wallace E. Tyner and Dileep K. Birur, 2008, 'Biofuels for all? Understanding the Global Impacts of Multinational Mandates', Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Orlando, FL, July 27-29, 2008
- HLPE, 2011. Price volatility and food security. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome 2011.
- Hoffman, Linwood A., & Allen Baker. Oct 2011. Estimating the Substitution of Distillers' Grains for Corn and Soybean Meal in the U.S. Feed Complex. USDA.
- Hossain, Naomi & Duncan Green, 2011. Living on a Spike: How is the 2011 food price crisis affecting poor people? Oxfam Research Reports. Institute of Development Studies and Oxfam GB, June 2011 <https://www.oxfam.org.nz/resources/onlinereports/rr-living-on-a-spike-food-210611-en.pdf>
- Irwin, S. H. and D. R. Sanders (2010), 'The Impact of Index and Swap Funds on Commodity Futures Markets: Preliminary Results', OECD Food, Agriculture and Fisheries Working Papers, No. 27, OECD Publishing. doi: 10.1787/5kmd40w1t5f-en
- Irwin, Scott H., 2008, 'Devil or Angel: The Role of Speculation in the Recent Commodity Price Boom', Farrell Distinguished Public Policy Lecture, Department of Food, Agricultural, and Resource Economics, University of Guelph, Canada, November 19, 2008
- Jayne, T. S. and Tschirley, D. (2009a) 'Food Price Spikes and Strategic Interactions between the Public and Private Sectors: Market Failures or Policy Failures?'. Presentation, FAO HQ, Rome, October.
- Jayne, T. S. and Tschirley, D. (2009b) 'Exploring the Logic Behind Southern Africa's Food Crises'. Presentation, Cornell University, May.
- Keats, Sharada; Steve Wiggins; Julia Compton & Marcella Vigneri, 2010. Food price transmission: rising international cereals prices and domestic markets. ODI Project Briefing, Oct 2010 <http://www.odi.org.uk/publications/5079-food-price-transmission>
- Keats, Sharada & Steve Wiggins, 2010. Non-staple foods & micro-nutrient status: effects of the 2007/08 food price spike. ODI Report.
- Keats, Sharada; Steve Wiggins & Edward Clay, Sep 2011. International rapid responses to the global food crisis of 2007-08. ODI report. <http://www.odi.org.uk/publications/6402-food-prices-food-security-evaluation-food-crisis-responses-2007-2008> Keats, Sharada & Steve Wiggins, 2011. China: are changes afoot for cereals? ODI Shockwatch: Managing Risk and Building Resilience in an Uncertain World. Working Paper
- Keleman, Alder & Hugo García Rañó, 2011. The Mexican tortilla crisis of 2007: the impacts of grain-price increases on food-production chains. Development in Practice; Volume 21, Issue 4-5, 2011; Special Issue: Global food-price shocks and poor people: themes and case studies
- Kodithuwakku, Sarath S.; & Jeevika Weerahewa, 2011. Coping with food price hikes: Strategies of the poor in Kandy, Sri Lanka, Asia-Pacific Research and Training Network on Trade Working Paper Series, No. 100, <https://www.econstor.eu/dspace/bitstream/10419/64288/1/661920089.pdf>
- Kumar, Neha & Agnes R. Quisumbing, June 2011. Gendered Impacts of the 2007-08 Food Price Crisis: Evidence Using Panel Data from Rural Ethiopia IFPRI Discussion Paper 01093. <http://www.ifpri.org/sites/default/files/publications/ifpridp01093.pdf>
- Locke, Anna; Steve Wiggins; Giles Henley; & Sharada Keats, March 2013. Diverting Grain from Animal Feed and Biofuels: Can it protect the poor from high food prices? ODI Report.
- Lustig, Nora. 2009. Coping with Rising Food Prices: Policy Dilemmas in the Developing World. Tulane University, Department of Economics, May. RePEc. CGD.
- Martin, Will & Kym Anderson, 2010, 'Trade Distortions and Food Price Surges', Paper for the World Bank-UC Berkeley Conference on Agriculture for Development – Revisited, Berkeley, 1-2 October 2010

- Masters, Michael W., 2008, Testimony of Michael W. Masters Managing Member / Portfolio Manager Masters Capital Management, LLC before the Committee on Homeland Security and Governmental Affairs United States Senate May 20, 2008
- McCreary, Ian, 2010, 'Protecting the food insecure', Draft for comment, April 2010, for Canadian Foodgrains Bank
- Minot, Nicholas, Jan 2011. Transmission of World Food Price Changes to Markets in Sub-Saharan Africa. IFPRI Discussion Paper 01059
- Mitchell, Donald, 2008, 'A Note on Rising Food Prices', Policy Research Working Paper 4682, Development Prospects Group, World Bank, July 2008
- Moseley, William G. (2011): Lessons from the 2008 global food crisis: agro-food dynamics in Mali, *Development in Practice*, 21:4-5, 604-612
- Murphy, Sophia, David Burch & Jennifer Clapp, 2012, *Cereal Secrets. The world's largest grain traders and global agriculture*, Oxfam Research Report August 2012, Oxford: Oxfam
- Nogues, Julio, 2012, 'Argentina's Export Barriers: Impacts on Prices, Rents and Output', Paper to the 28th International Conference of Agricultural Economists [ICAE], 19 to 24 August 2012, Foz do Iguaçu, Brazil
- Nose, Manabu & Futoshi Yamauchi. May 2012. Long-term Impacts of Global Food Crisis on Production Decisions: Evidence from Farm Investments in Indonesia. Policy Research Working Paper 6065. The World Bank Multilateral Investment Guarantee Agency.
- Peeters, Loek E.A. & Daniel G. Maxwell, June 2011. Characteristics and strategies favouring sustained food access during Guinea's food-price crisis, *Development in Practice*, 21:4-5, 613-628
- Perez, Carlos A; Claire Nicklin & Sarela Paz (2011): Food crisis, small-scale farmers, and markets in the Andes, *Development in Practice*, 21:4-5, 566-577 <http://www.tandfonline.com/doi/pdf/10.1080/09614524.2011.562486>
- Piesse, Jenifer & Colin Thirtle, 2009. Three bubbles and a panic: An explanatory review of recent food commodity price events. *Food Policy* 34, 119–129.
- Polaski, Sandra, 2008, 'Rising Food Prices, Poverty, and the Doha Round', Carnegie Endowment for International Peace, Policy Outlook, May 2008
- Prevel, Yves Martin; Elodie Becquey; Sylvestre Tapsoba; Florence Castan; Dramane Coulibaly; Sonia Fortin; Mahama Zoungrana; Matthias Lange; Francis Delpuech; & Mathilde Savy, 2012. The 2008 Food Price Crisis Negatively Affected Household Food Security and Dietary Diversity in Urban Burkina Faso. *The Journal of Nutrition* September 1, 2012 vol. 142 no. 9 1748-1755.
- Provost, Claire. April 27, 2012. New international land deals database reveals rush to buy up Africa. *The Guardian*. <http://www.guardian.co.uk/global-development/2012/apr/27/international-land-deals-database-africa>
- Robles, Miguel, Maximo Torero, and Joachim von Braun, 2009, 'When speculation matters', IFPRI Issue Brief 57, February 2009, International Food Policy Research Institute, Washington DC
- Rosegrant, Mark W., 2008, *Biofuels and Grain Prices: Impacts and Policy Responses*, Testimony for the U.S. Senate Committee on Homeland Security and Governmental Affairs, May 7, 2008
- Sanders, D.R., S.H. Irwin, and R.P. Merrin, 2008, 'The Adequacy of Speculation in Agricultural Futures Markets: Too Much of a Good Thing?' Marketing and Outlook Research Report 2008-02, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, June 2008. [<http://www.farmdoc.uiuc.edu/marketing/reports>]
- Santoalla, Edgardo L., 2011. Food-price hikes and the situation of farm workers in the Philippines. *Development in Practice*; Volume 21, Issue 4-5, 2011; Special Issue: Global food-price shocks and poor people: themes and case studies. pages 732-740
- Schüttel; Carsten; Ulrich Kleinwechter; Rico Ihle c; & Harald Grethe, 2011. Domestic policy responses to the food price crisis: The case of Bolivia. *Journal of Agriculture and Rural Development in the Tropics and Subtropics* Vol. 112 No. 2 (2011) 125–139
- Smale, Melinda; Lamissa Diakité & Naman Keita, 2011. Location, vocation, and price shocks: cotton, rice, and sorghum-millet farmers in Mali. *Development in Practice* Volume 21, Issue 4-5, 2011 Special Issue: Global food-price shocks and poor people: themes and case studies
- Sophal, Chan (2011) The impact of high food prices on food security in Cambodia, *Development in Practice*, 21:4-5, 718-731
- Spratt, Stephen, January 2013. Food price volatility and financial speculation. IDS, Future Agricultures Consortium. Working Paper 047
- Swinnen, Johan & Pasquaria Squicciarini, 2012, 'Global food supply. Mixed Messages on Prices and Food Security', *Science*, 27 January 2012, 335, 405–406
- Ticci, Elisa (2011): Can inflation be a good thing for the poor? Evidence from Ethiopia, *Development in Practice*, 21:4-5, 629-641

- Timmer, C. Peter, 2008, 'Causes of high food prices', Asian Development Outlook 2008 Update, Manila: Asian Development Bank
- Timmer, C. Peter., 2010. Reflections on food crises past. Food Policy 35, 1-11.
- Trego, Rachel, 2011. The functioning of the Egyptian food-subsidy system during food-price shocks. Development in Practice Volume 21, Issue 4-5, 2011; Special Issue: Global food-price shocks and poor people: themes and case studies
- Trostle, Ronald, 2008a, Global agricultural supply and demand: factors contributing to the recent increase in food commodity prices, WRS-0801, Report from Economic Research Service, US Department of Agriculture, Washington DC, May 2008
- Trostle, Ronald, 2008b, 'Fluctuating Food Commodity Prices. A Complex Issue With No Easy Answers', Amber Waves, 6 (5), 10-17
- von Braun, Joachim & Maximo Torero, June 2008. Physical and Virtual Global Food Reserves to Protect the Poor and Prevent Market Failure. IFPRI Policy Brief 4.
- Wahenga, 2010, 'Policy options for reducing risk and instability in staple food markets', Frontiers of social protection policy brief, 6, April 2010. Parktown, Johannesburg, South Africa: Regional hunger & vulnerability programme
- Wiggins, Steve & Sharada Keats, Jan 2010. Grain stocks and price spikes. ODI Report. <http://www.odi.org.uk/publications/4705-grain-stocks-price-spikes>
- Wiggins, Steve; Sharada Keats & Julia Compton, March 2010. What caused the food price spike of 2007/08? Lessons for world cereals markets. ODI Report. <http://www.odi.org.uk/publications/4987-caused-food-price-spike-200708-lessons-world-cereals-markets>
- Wiggins, Steve; Julia Compton & Sharada Keats. June 2010. Preparing for future shocks to international staple food prices: What can the international community and the UK Government do to help?. ODI Report.
- Wiggins, Steve; Julia Compton; Sharada Keats & Mark Davies, July 2010. Country responses to the food price crisis 2007/08: Case studies from Bangladesh, Nicaragua, and Sierra Leone. ODI Report. <http://www.odi.org.uk/publications/5097-country-responses-food-price-crisis-200708-case-studies-bangladesh-nicaragua-sierra-leone>
- Wiggins, Steve, Enrica Fioretti, Jodie Keane, Yasmeen Khwaja, Scott McDonald, Stephanie Levy & C S Srinivasan, 2008, Review of the indirect effects of biofuels: Economic benefits and food insecurity, Report to the Renewable Fuels Agency, 26 June 2008
- Wise, Timothy A. & Sophia Murphy, 2011, DRAFT Dec 02, 2011, 'Global Agricultural Governance in an Era of High and Volatile Food Prices', Draft: Not for Circulation or Citation
- Wood, Benjamin; Carl H. Nelson; Talip Kilic & Siobhan Murray, 2012. Up in Smoke?: Agricultural Commercialization, Rising Food Prices and Stunting in Malawi. International Association of Agricultural Economists 2012 Conference, August 18-24, 2012, Foz do Iguaçu, Brazil <http://ageconsearch.umn.edu/bitstream/131261/2/Wood%20IAAE.pdf>
- Worthy, Murray, September 2011. Broken markets: How financial market regulation can help prevent another global food crisis. World Development Movement.
- Wright, Brian & Carlo Cafiero, 2010, Grain Reserves and Food Security in MENA Countries, Paper to Agriculture for Development - Revisited, A World Bank, UC Berkeley, CEGA, SPIA, and Ford Foundation Conference, October 1 and 2, 2010, Berkeley, Ca
- Wright, Brian, 2011, 'Addressing the biofuels problem: food security options for agricultural feedstocks', in Prakash, Adam, ed., Safeguarding food security in volatile global markets, Rome: Food and Agriculture Organization of the United Nations, Rome, 2011
- Yang, Jun Huanguang Qiu, Jikun Huang & Scott Rozelle, 2008, 'Fighting global food price rises in the developing world: the response of China and its effect on domestic and world markets', Agricultural Economics 39 supplement 453-464
- Young, Mary M. (2011): Revisiting the impact of economic crisis on Indonesian agro-food production, Development in Practice, 21:4-5, 705-717
- Yu, Wusheng & Hans G Jensen, 2011. Trade policy responses to food price rises and implications for existing domestic support measures: the case of China in 2008. Institute of Food and Resource Economics, Paper prepared for presentation at the EAAE 2011 Congress Change and Uncertainty Challenges for Agriculture, Food and Natural Resources August 30 to September 2, 2011 ETH Zurich, Zurich, Switzerland

Appendix A: Changes and trends in under-fives Stunting, Underweight, and Wasting available before, during and after the 2007/08 food price spike

Figure 30: Map of countries covered before, during and after 2007/08 in the WHO database



The figures in this section show changes in percentage points of prevalence of underweight (low weight for age), stunting (low height for age) and wasting (low weight for height) in under-fives as measured in nationally representative nutrition surveys from before and after (or during) the food price spike. Where possible, data is disaggregated by rural/urban and gender of the children.

Dates over which data is presented are provided in the horizontal axes of the figures. Red columns indicate a worsening of the malnutrition indicators presented, while green columns represent improvements.

Interpretation of the data in this annex is subject to key limitations including:

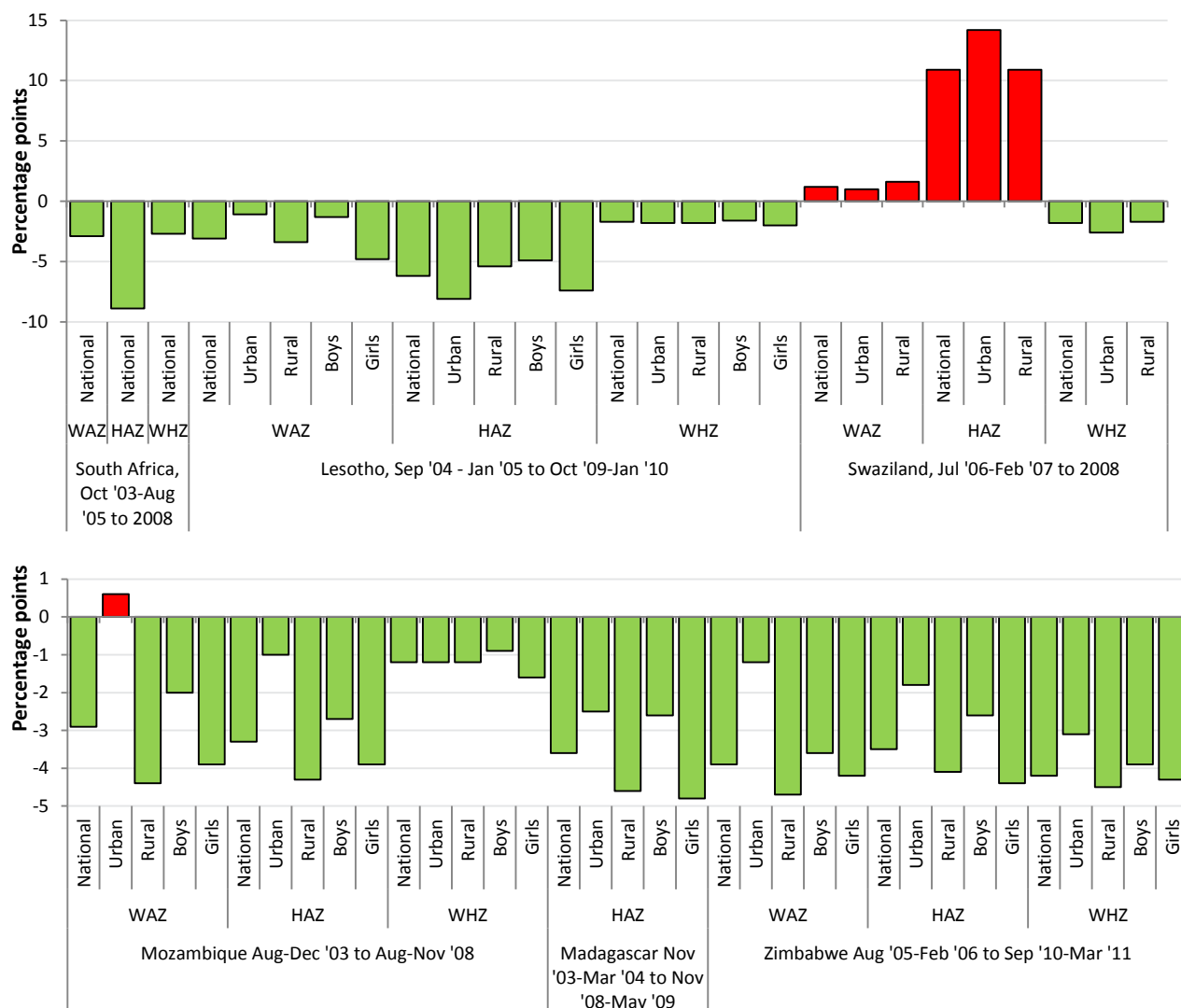
- Where data is not collected directly adjacent to the price spike, changes in rates (particularly of wasting which can change more in the short-term) may not have been captured.
- In the absence of a counter-factual, the degree to which changes captured may be attributable to the food price spike is not clear. Where they increase there may be other driving factors. Where they decrease or stay the same, they may have decreased faster without a price spike.

In spite of these limitations, the figures are worth examining simply to see if they illustrate any indication that price spike might have fed through to national level food security indicators as measured by the nutrition of pre-schoolers – among those most vulnerable to food insecurity fluctuations.

A.1 Changes in Underweight (WAZ), Stunting (HAZ) and Wasting (WHZ) of children under five from before the price spike to afterwards (or during).

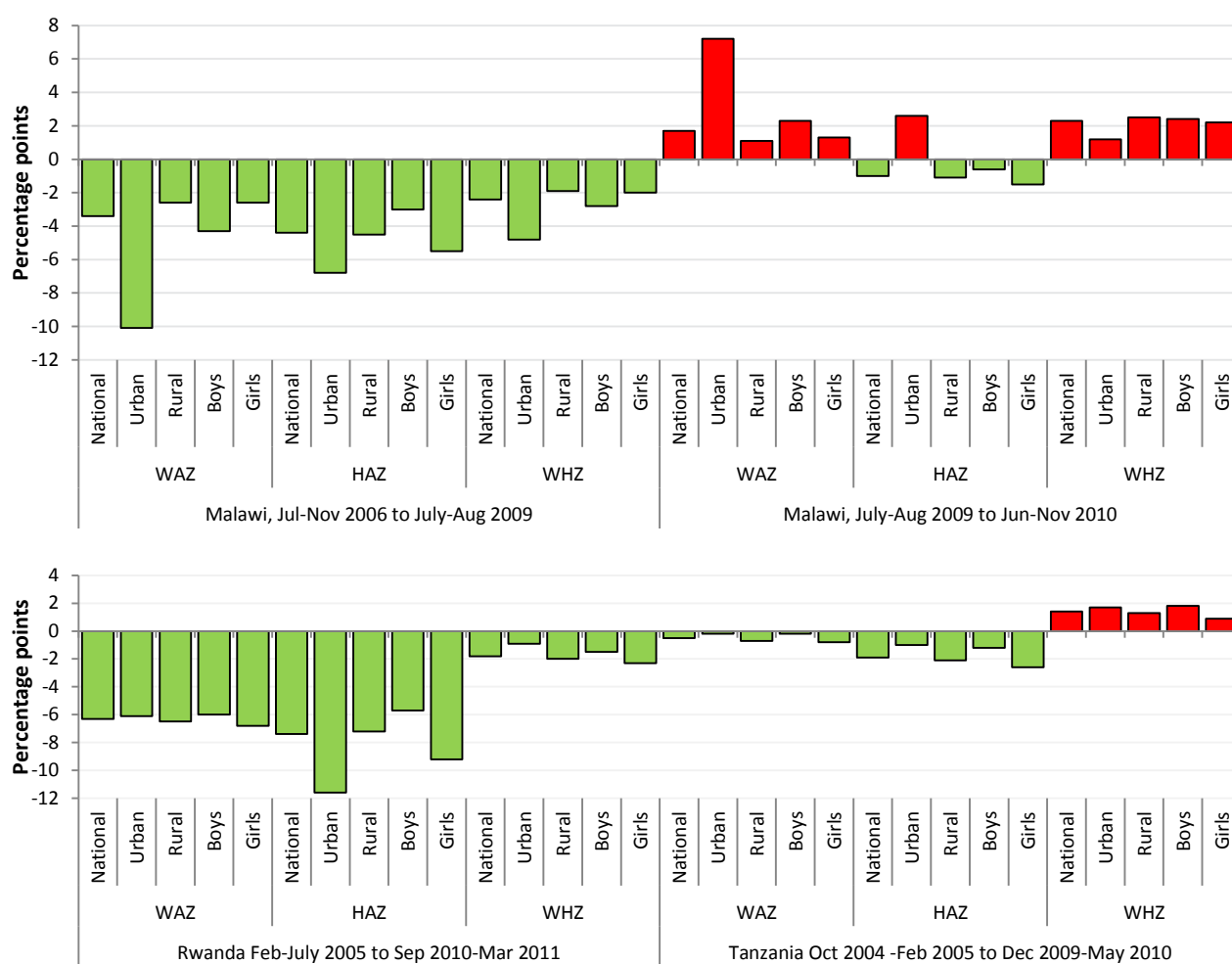
Africa

Figure 31: Changes in WAZ, HAZ, WHZ, (% of under-fives) Southern Africa



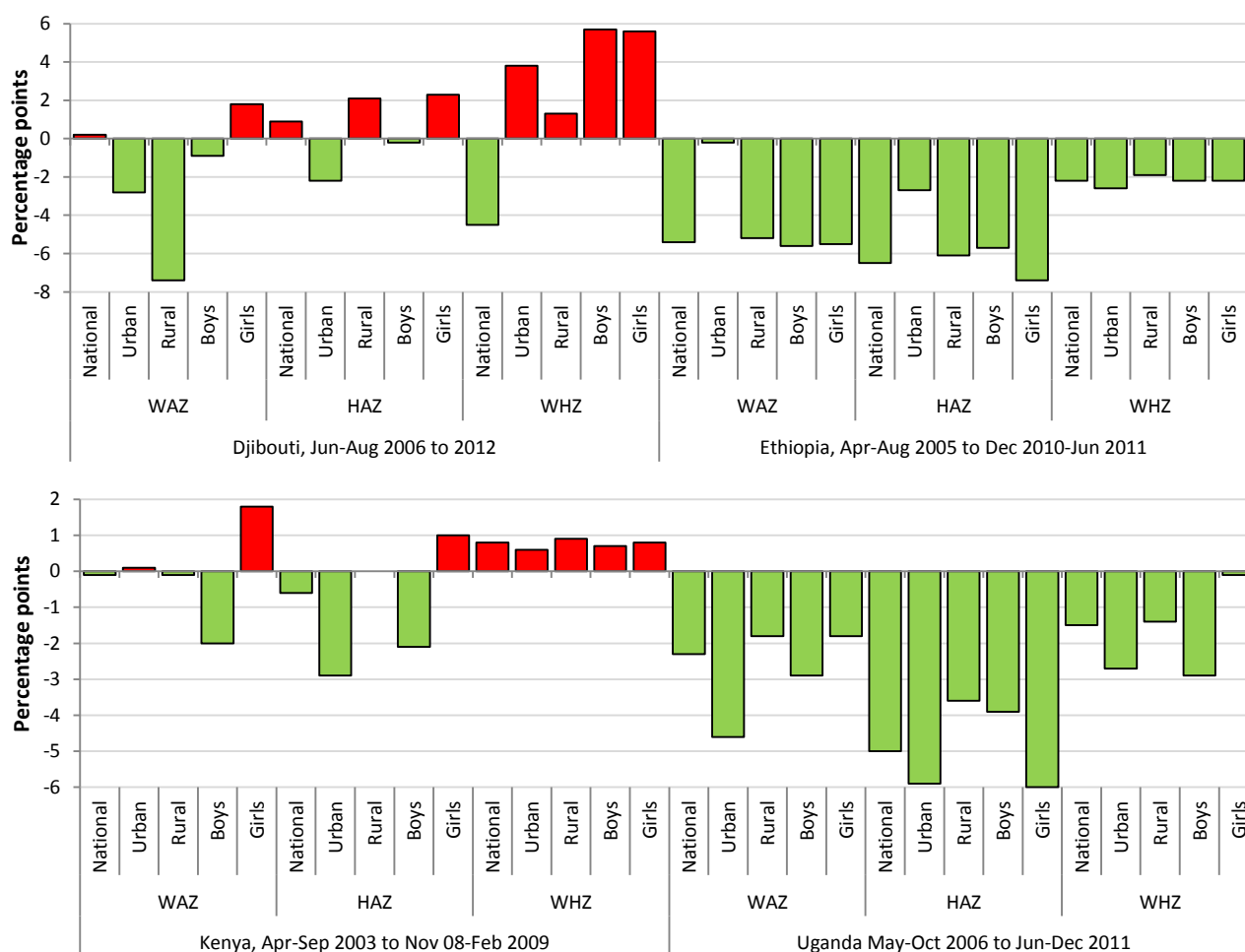
Source: With data from WHO Global Database on Child Nutrition

Figure 32: Changes in WAZ, HAZ, WHZ, (% of under-fives) Eastern Africa



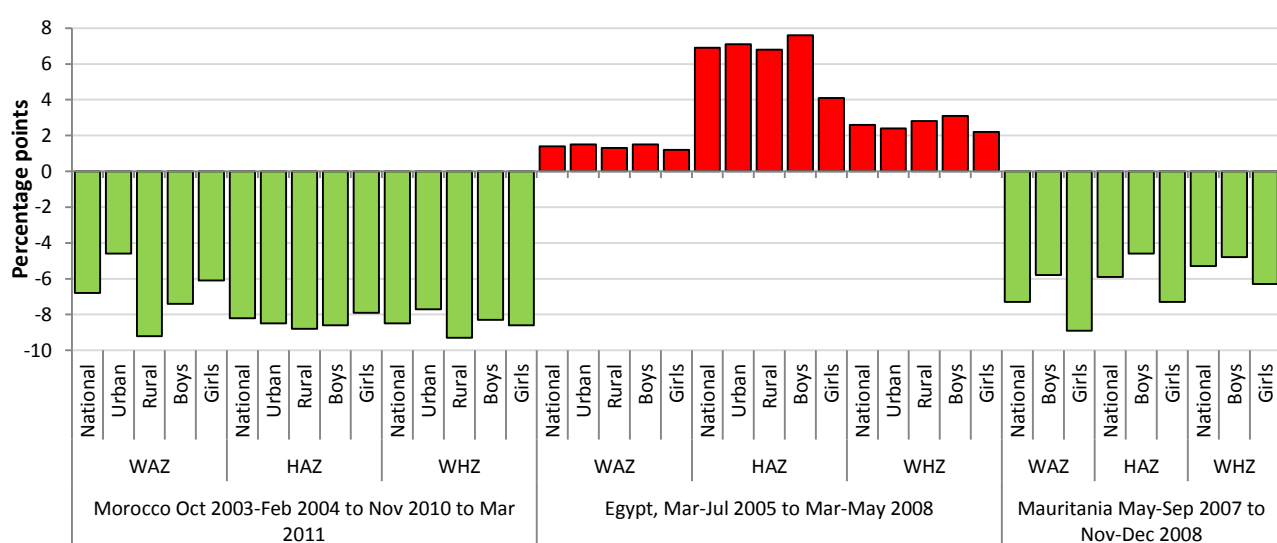
Source: With data from WHO Global Database on Child Nutrition

Figure 33: Changes in WAZ, HAZ, WHZ, (% of under-fives) Horn of Africa



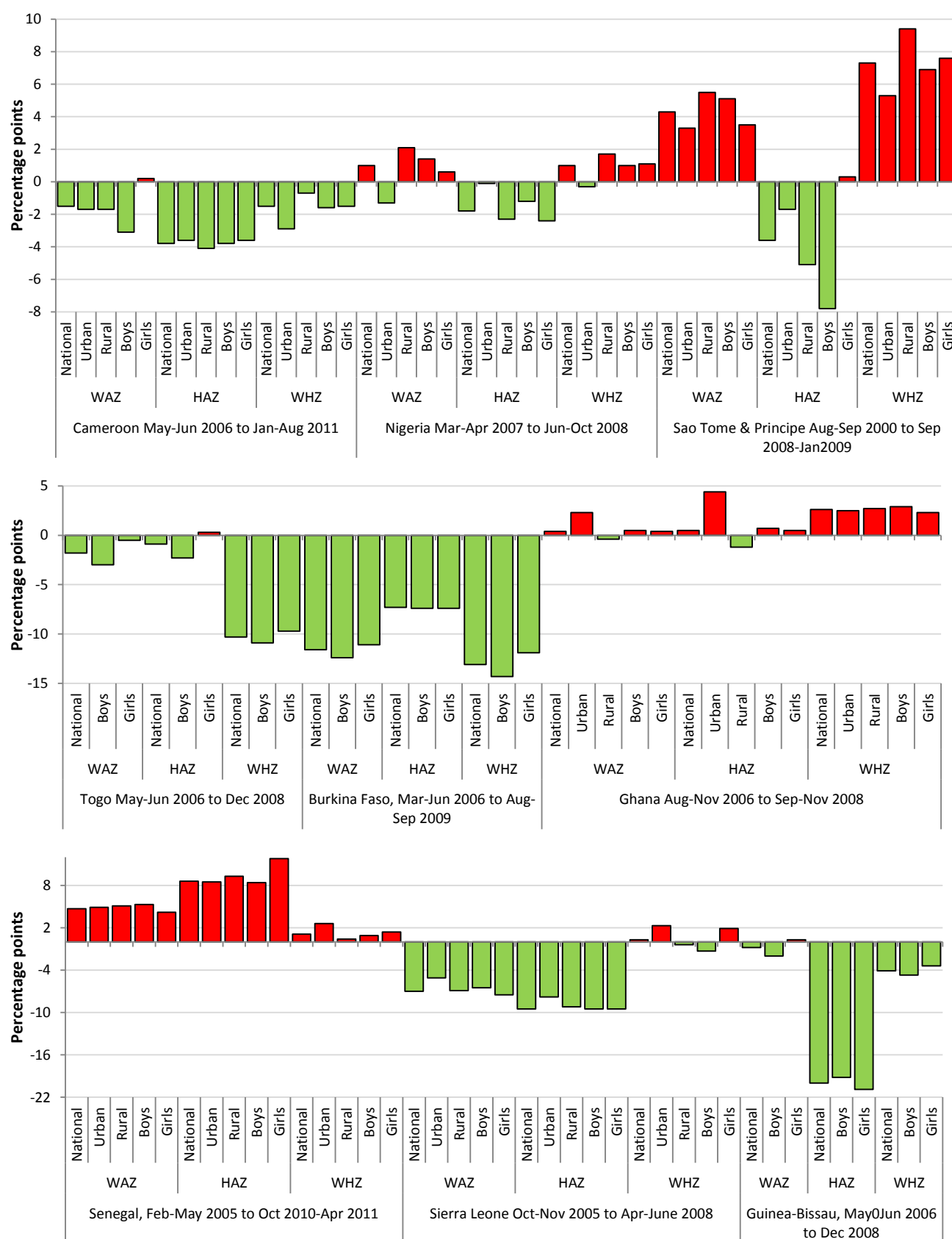
Source: With data from WHO Global Database on Child Nutrition

Figure 34: Changes in WAZ, HAZ, WHZ, (% of under-fives) Northern Africa



Source: With data from WHO Global Database on Child Nutrition

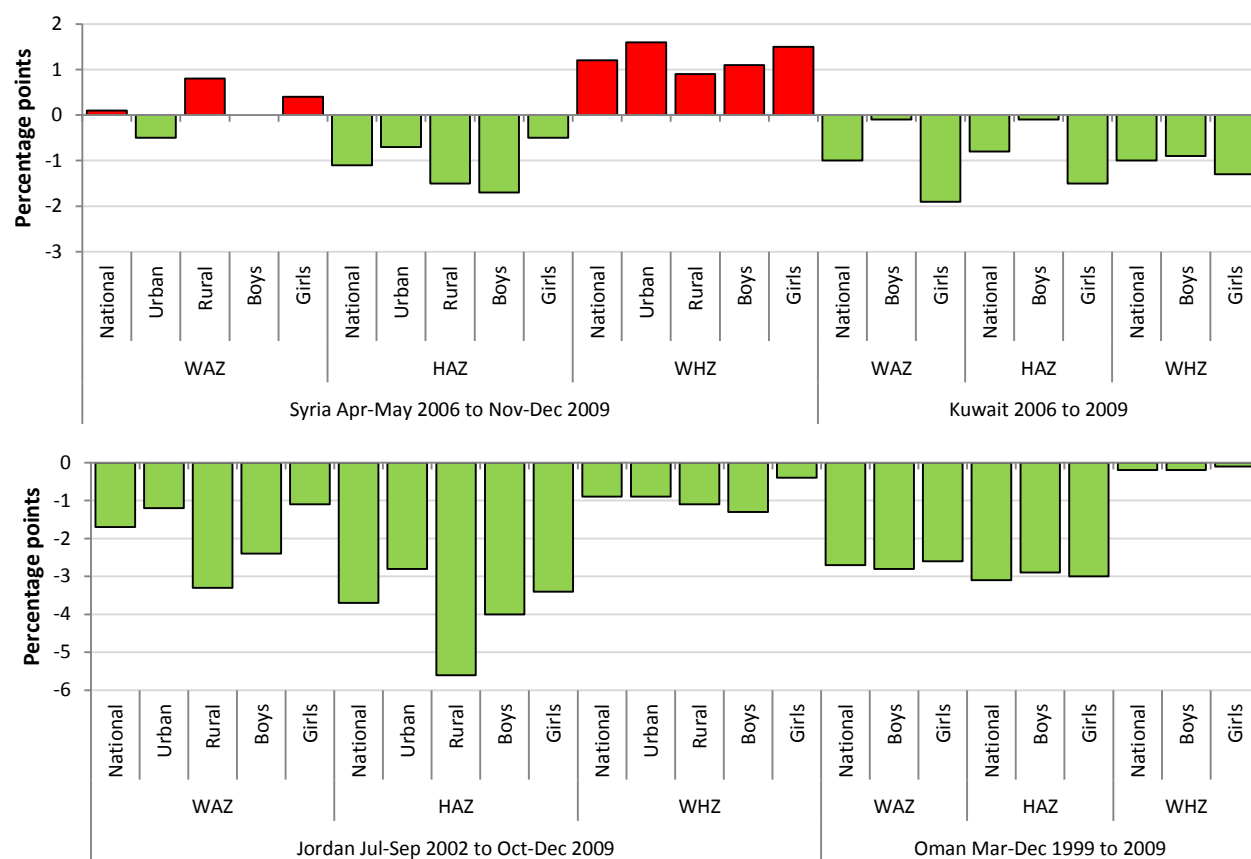
Figure 35: Changes in WAZ, HAZ, WHZ, (% of under-fives) Western Africa



Source: With data from WHO Global Database on Child Nutrition

Middle East

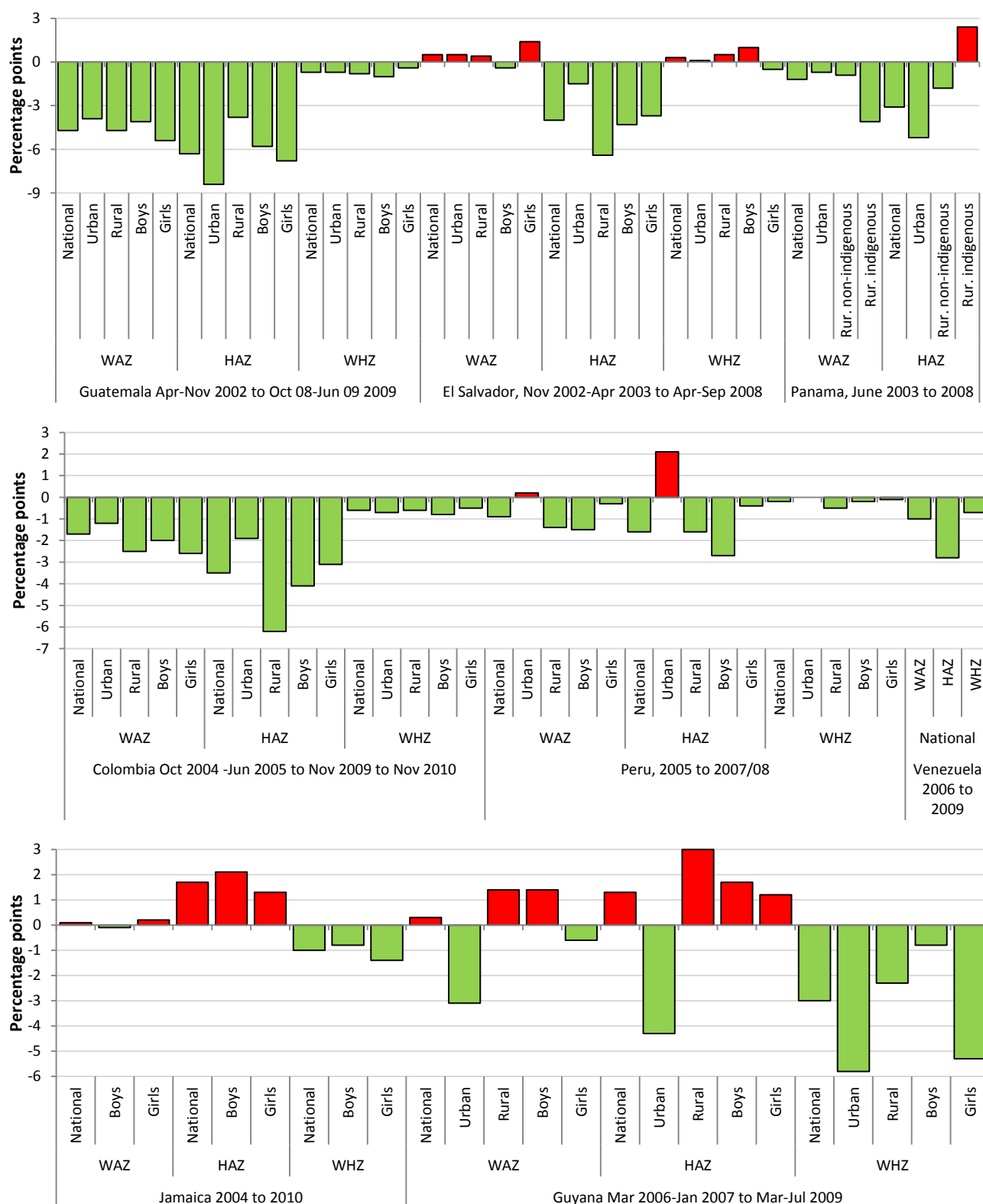
Figure 36: Changes in WAZ, HAZ, WHZ, (% of under-fives) Middle East

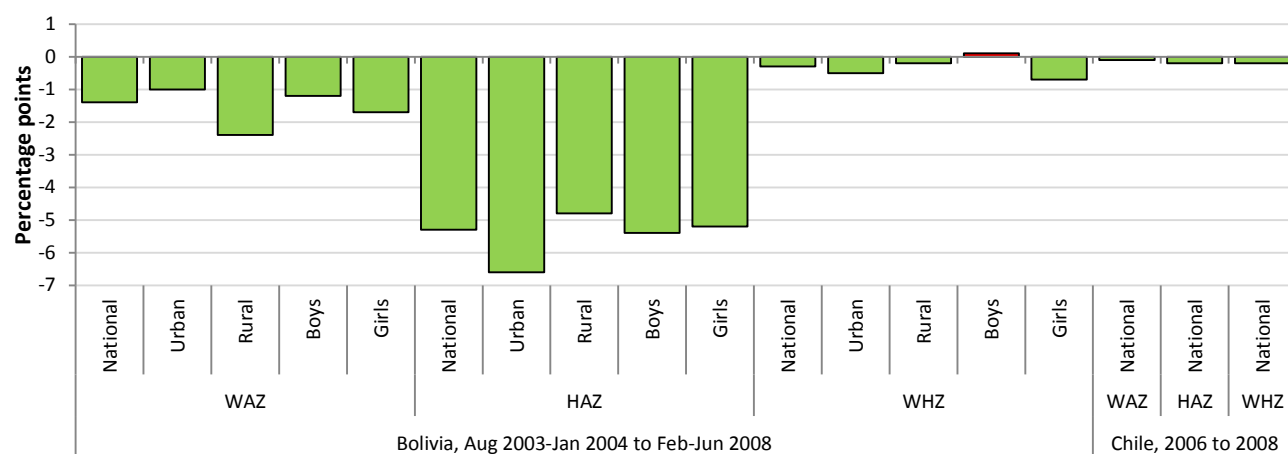


Source: With data from WHO Global Database on Child Nutrition

Latin America & the Caribbean

Figure 37: Changes in WAZ, HAZ, WHZ, (% of under-fives) Latin America, Caribbean

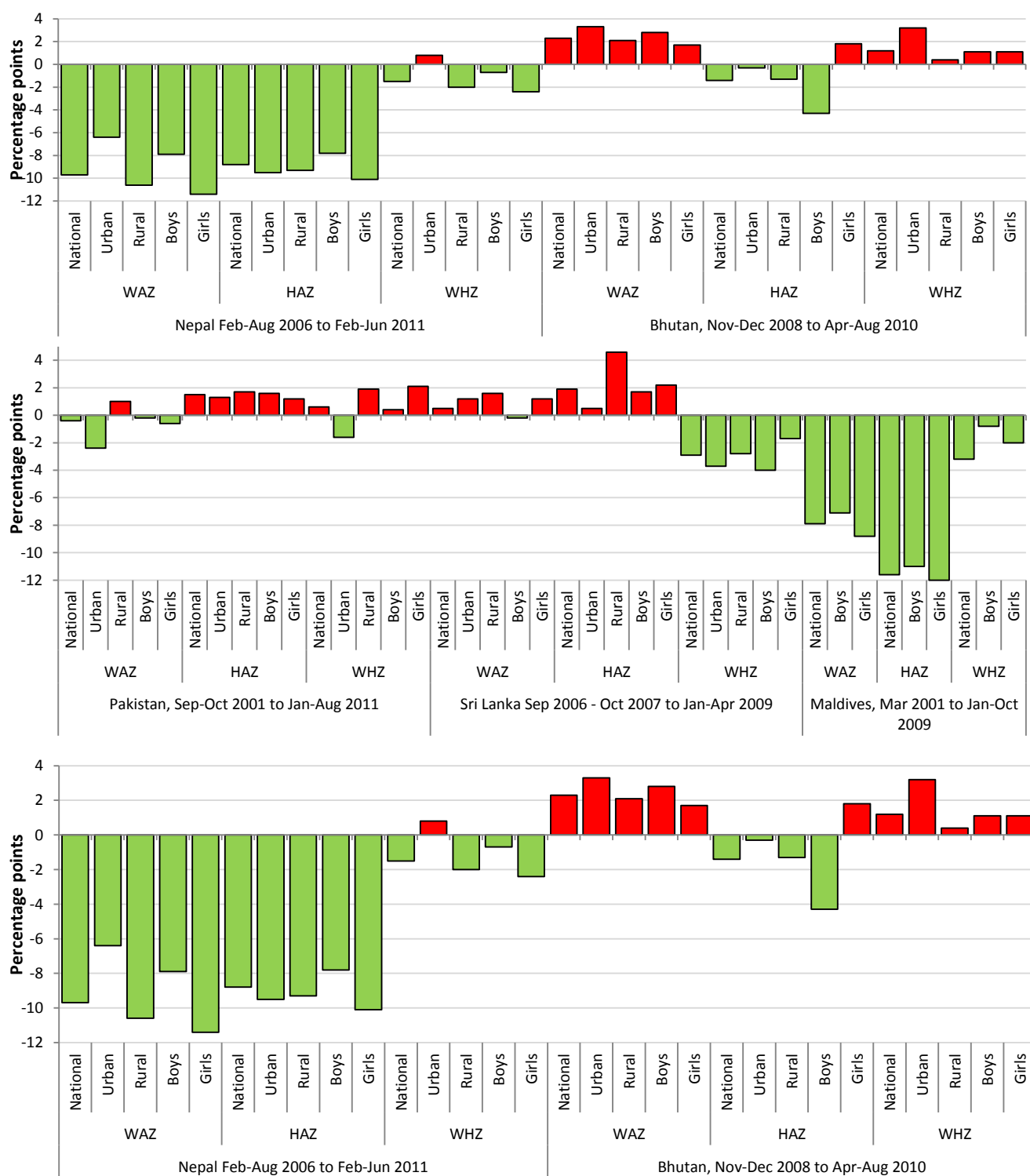




Source: With data from WHO Global Database on Child Nutrition

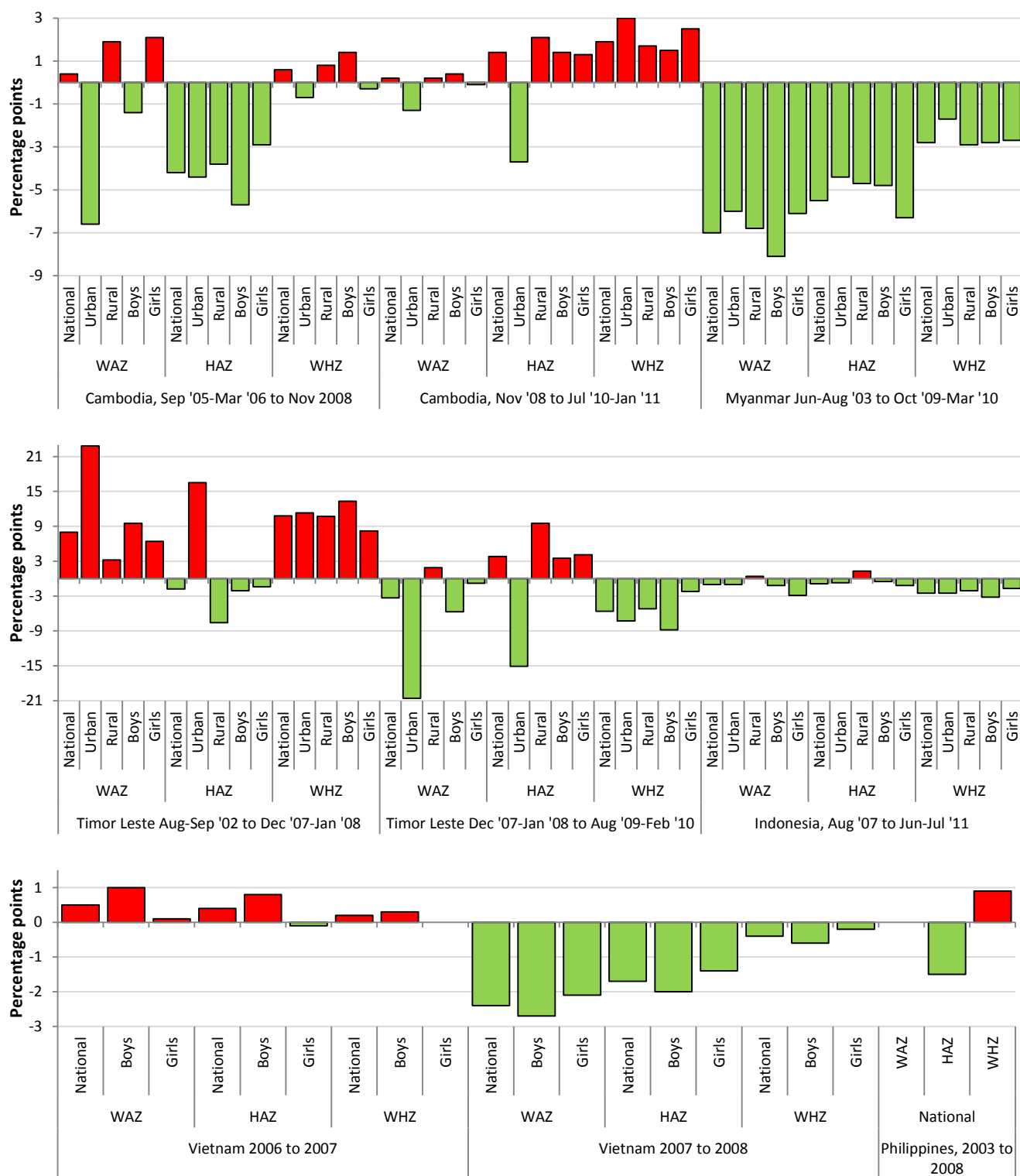
Asia

Figure 38: Changes in WAZ, HAZ, WHZ, (% of under-fives) South Asia



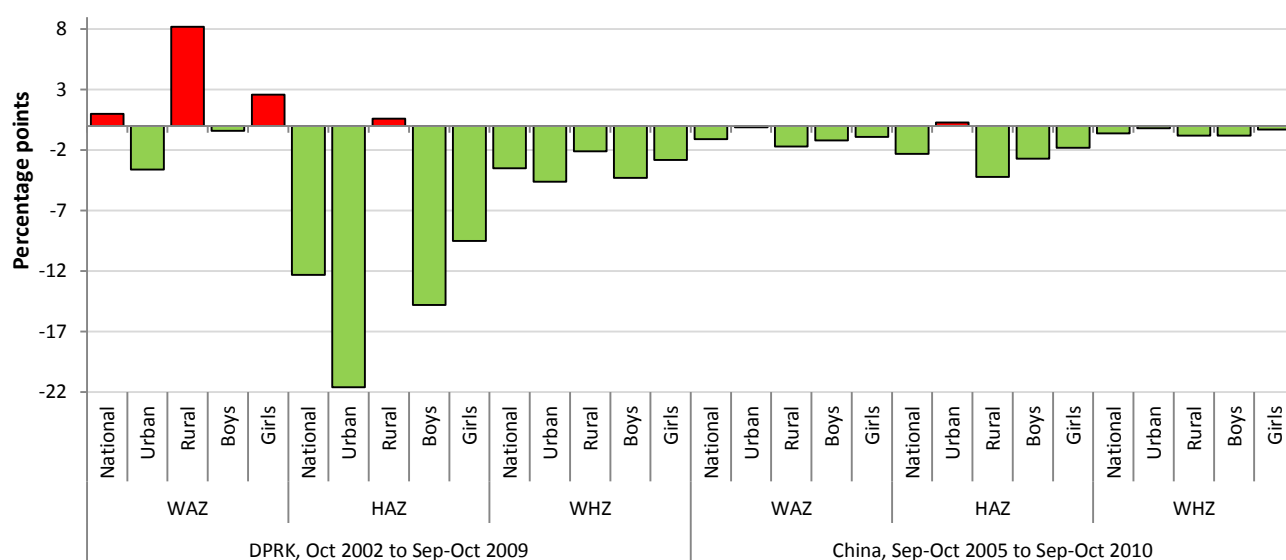
Source: With data from WHO Global Database on Child Nutrition

Figure 39: Changes in WAZ, HAZ, WHZ, (% of under-fives) South-East Asia



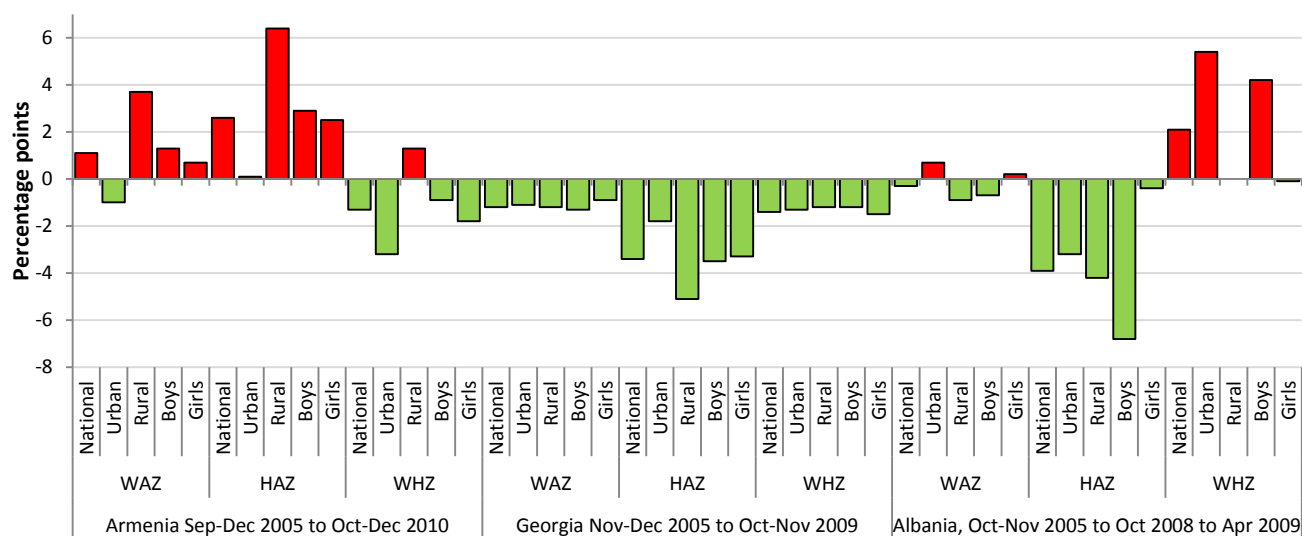
Source: With data from WHO Global Database on Child Nutrition

Figure 40: Changes in WAZ, HAZ, WHZ, (% of under-fives) East Asia



Source: With data from WHO Global Database on Child Nutrition

Figure 41: Changes in WAZ, HAZ, WHZ, (% of under-fives) Europe



Source: With data from WHO Global Database on Child Nutrition