Food Prices: 2014/15 Annual review

Update on domestic prices and stunting after the 2007/08 spike

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Key messages

The 2014/15 marketing year saw:

- Record global harvests were achieved for 2014/15 for the three main cereals, as farmers respond to high prices.
- Maize and wheat prices fell, while rice prices remained relatively stable over the marketing year.
- After several years of high and volatile prices, spot prices of maize, wheat, and rice are reaching new equilibria — and may drop further in light of the large oil price falls seen since late 2014.

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Summary

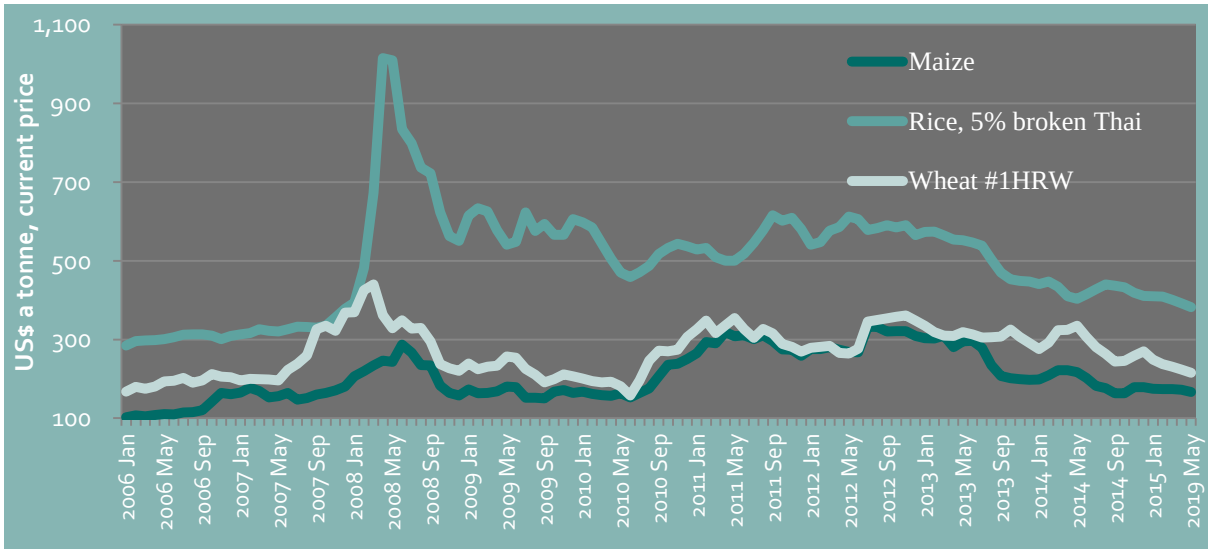
The Annual Review examines changes to cereals prices seen since May 2014; looks at how domestic prices for cereals in the developing world have moved since the 2007/08 price spike; and, in a special essay, examines some evidence on the consequences of the price spike for children's nutrition.

Cereals prices continue to fall following another good year for cereals harvests

With no major harvest failures, world cereals production rose again during the 2014/15 marketing year, to 2,193M tonnes of maize, rice (milled) and wheat. This should be 28M tonnes more than expected consumption, so that stocks will again rise, to reach more than 22% of annual use.

Consequently cereals prices have fallen, continuing the pattern seen since late 2012 (Figure A). Prices of the three main grains are now, in constant terms, almost the same as they were before 2007/08 price spike for rice and wheat, while maize prices remain 20% higher than their pre-spike level.

Figure A: Cereals prices, US$ a tonne current, January 2006 to May 2015



Source: IMF primary commodity prices

Last year this Review argued that a new equilibrium had been reached for grain prices, higher than in the early 2000s but lower than seen in the turbulent years from 2007 to 2012, with little chance of seeing any significant price increases. Given the fall in oil prices seen since mid-2014 bringing down production costs, that assessment applies all the more strongly. Moreover the steady build-up of cereals stocks means that harvest failures are less likely to lead to large and sudden price increases.

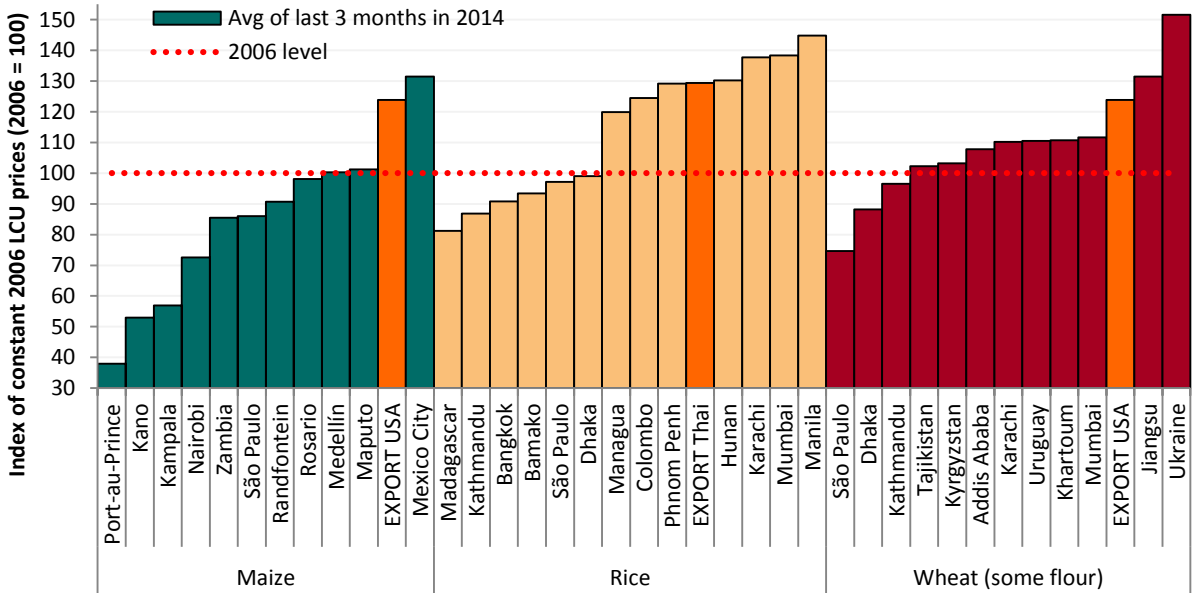
Changes in cereals prices on the domestic markets of the developing world

While international prices may be achieving a new equilibrium, some domestic markets remain significantly insulated from the world market. Their prices are determined to a greater extent by local harvests, as in much of sub-Saharan Africa, or by concerted domestic policy to control prices, as exemplified by China and India.

Where domestic prices rose at the time of international price spikes, the increases were in most cases usually considerably muted compared to changes on international markets. Since 2007/08 domestic prices for cereals have fallen back, but not always to their levels before the spike.

Comparing prices in the last quarter of 2014 to those in 2006 (Figure B) shows that in 11 out of 13 countries maize prices in constant terms had fallen back to, or below, their 2006 levels. For rice, prices fell back to 2006 levels in six countries, but were higher in seven countries. For wheat, only three countries had seen domestic prices fall back to 2006 levels. In most cases domestic prices had fallen by more than the international price.

Figure B: Real prices in the last 3 months of 2014, compared to their 2006 levels (%)



Source: Price data from FAO GIEWS, local GDP deflators from World Bank WDI. For more detail see notes to Figures 8-10

The degree of price volatility in domestic cereals markets varied considerably across countries. Simple averages across the countries, however, suggest that on balance domestic prices have been less volatile than international prices, especially during the 2007/08 price spike.

Did high prices in 2007/08 harm children's nutrition?

Surprisingly few, just six, reports on direct observations of the impact of higher prices on children's nutrition can be found. This limited evidence for just seven countries confirms expectations: that higher food prices in the developing world led to less access to food for households on low incomes, and worse nutrition for the children of such households. In some cases, however, higher food prices were offset by rising incomes.

With only such patchy evidence, we turned to national reports, mainly Demographic and Health Surveys, on stunting of children aged under five years to find statistics on rates of stunting before, during and after the 2007/08 price spike at country level.

A first examination of the statistics for 43 countries with high rates of stunting shows that stunting in most countries was usually better after the price spike of 2007/08 than before it. That, however, does not necessarily mean that higher prices had no effect on child malnutrition: stunting might have fallen even more had prices not risen. By examining trends in stunting before the spike, counterfactual analyses could be constructed for ten countries that had enough surveys to establish trends.

Only in four countries did it seem that stunting was higher than the trend would have predicted in 2008. Even then, in two of the four countries, stunting levels fell back a few years later to below the previous trend.

Girls' nutrition suffered more during the price spike than boys' nutrition in several cases. In some countries, with Indonesia the prime example, the children of households on low incomes suffered more than those from higher income households.

The greater the rise in domestic food prices from 2006 to 2008, and from 2006 to 2011, the more declines in stunting slowed. The correlation between prices and stunting, however, is modest.

Overall, it seems that higher domestic food prices at the time of the 2007/08 spike in cereals prices on world markets has not resulted in more children stunted than expected in most countries. Even when higher prices did harm child malnutrition, within a few years stunting rates fell back to expected trends.

A striking additional finding from the counterfactual analyses is that in several countries — Burkina Faso, Ghana, Niger, Nigeria and Peru — reductions in stunting accelerated since the mid-2000s. These improvements most probably stem from better health services, specific nutrition programmes, and better sanitation that have outweighed any possible deterioration in food access. Stunting in Niger fell considerably even through the 2010 food crisis.

These findings need some qualification since neither data availability nor depth of analysis are optimal. Few developing countries carry out national surveys of child nutrition more often than once every five years. That prevents observations of changes that may apply over shorter periods, as may be expected with food price spikes. Some countries have even less regular surveys so that trends cannot be reliably established.

This analysis was not able to probe changes in stunting of age cohorts among children aged less than five. Hence in cases such a Viet Nam where stunting rose above the trend in 2008 but then later fell back to below the trend, the 'recovery' of stunting could be simply a cohort effect, rather than children recuperating. Some of the increased numbers of children stunted in 2008 would not be measured again in subsequent surveys, since the affected cohorts would have reached five years. By 2013, all children observed in 2008 will have aged beyond the sample age group. A more detailed analysis would look to cases where specific age cohorts can be traced from before the spike, through it, and after. Very few developing countries, however, have the frequency of surveys to make this possible — Peru may be the only one.

The analysis of effects broken down by sex of child and income of household has been exploratory. If children from poor households were hit harder by higher prices, and if girls suffered more than boys, then nutritional harm — at very least proportionately among more vulnerable children — could be greater than aggregated national statistics show.

What may be the ***policy lessons*** from these findings?

Higher food prices are likely, all other things being equal, to lead to less food access and hence worsened nutrition for children. Effects should be more severe for children in low-income households. Hence when food prices rise sharply, social protection for vulnerable groups is indicated. That is usually only possible when some form of social protection is already in place that can be enhanced or scaled out during price spikes. For example, the value of a cash transfer could be increased or a public employment programme expanded.

All other things, however, are not equal. Child nutrition might be protected during food price spikes by economic growth with rising wages; or by public programmes to improve child care and health that might offset any reduction in access to food.

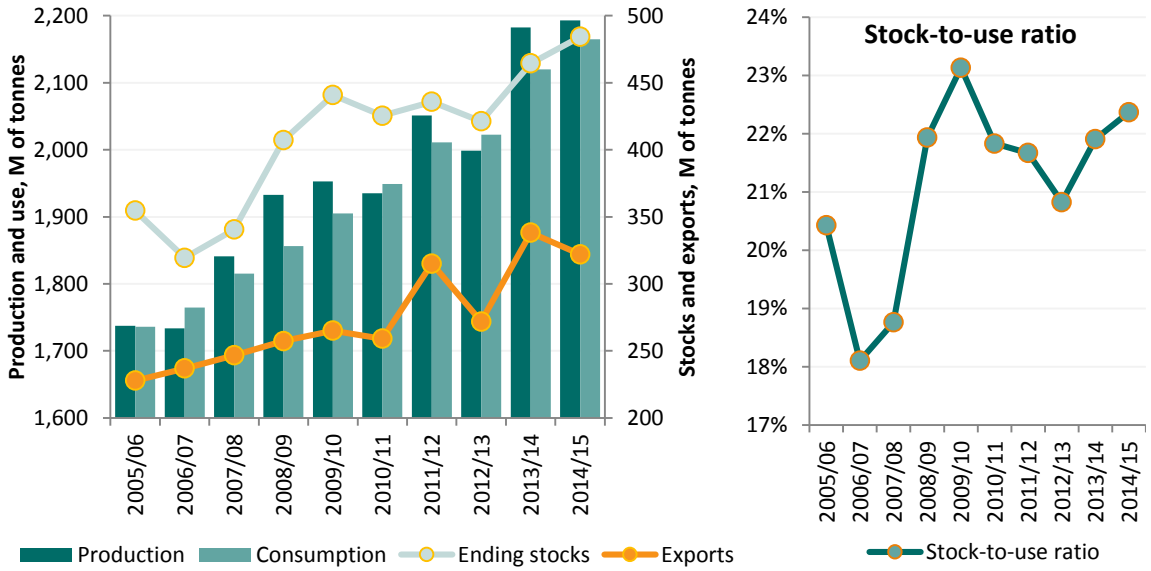
Policy might also be tailored to protect girls in crises. Where social protection exists, transfers could be increased for families with girls. Health professionals could also be required to monitor growth of girls more closely as part of routine health checks. How appropriate these policies might be depends somewhat on what causes girls' disadvantage in the first place.

More frequent surveys of child nutrition would help policy-makers to identify problems and vulnerable children, to increase the precision of policy response.

1 Another good year for cereals

The estimated harvest of major cereals for 2014/15 will be 2,193M tonnes consisting of 992M tonnes of maize, 726M tonnes of wheat, and 475M tonnes of milled rice [April 2015 estimate[1]]. This is another record, up by about half a percent on the previous year: a small increase, but not disappointing considering 2013/14 production was 9% more than 2012/13. Production should be 28M tonnes more than expected consumption, so stocks should to rise to more than 22% of annual use: see Figure 1.

Figure 1: Major cereals global production, consumption, stocks and exports, 2005/06 to 2014/15



Source: Data from USDA FAS for maize, wheat, and milled rice.

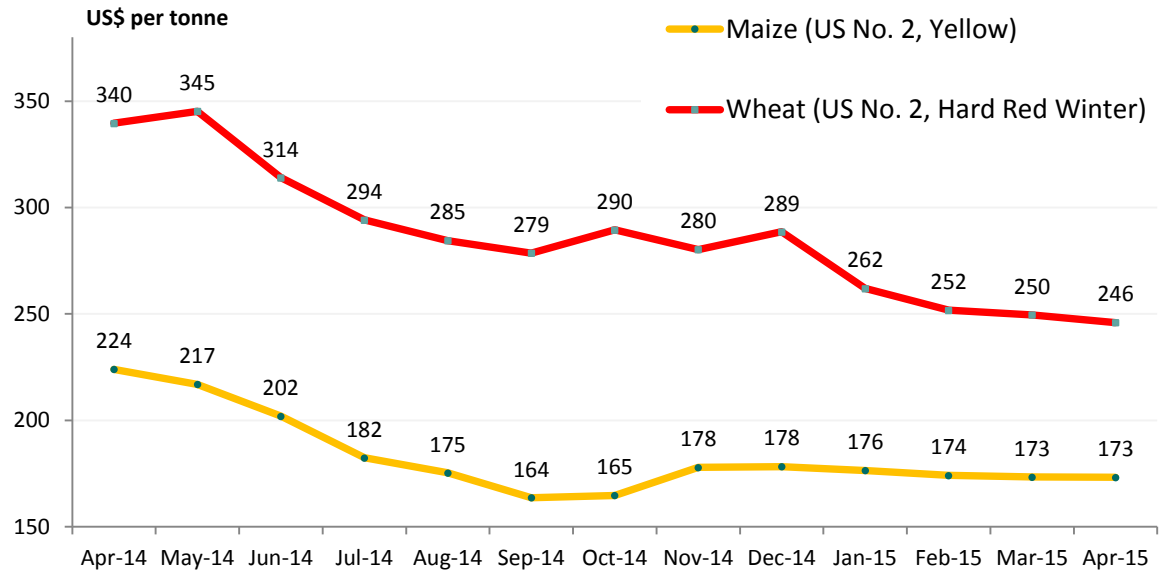
1.1 World prices: maize & wheat

Both maize and wheat saw large harvests. Consequently for much of the year prices continued to decline, as they have since late 2012 (Figure 2). By April 2015, maize prices at US$173 a tonne were down by US$50 a tonne from their level in April 2014, while wheat prices at US$246 a tonne had fallen by almost US$95 a tonne over that time.

Futures prices for both maize and wheat (Figures 3 and 4) fell from May 2014 to October 2014. Both then rose a little, but fell again since late December 2014. In early May 2015, maize futures were around US$60 a tonne lower than they were a year earlier, while wheat futures were around US$80 a tonne lower. Moreover, compared to April spot prices, maize futures prices were about US$30 a tonne lower, while wheat futures are about US$70 a tonne lower, indicating traders expect further price falls in the near future.

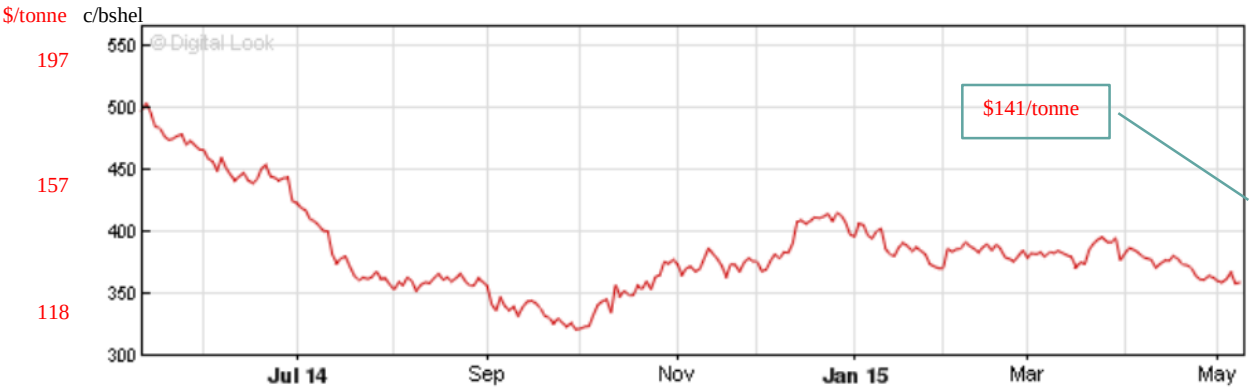
[1] In May 2014, USDA's first projections for key cereal harvests in 2014/15 predicted 979M tonnes of maize, 697M tonnes of wheat and 481M tonnes of milled rice; so only rice production has been lower than expected in early projections, and only by 6M tonnes (some 1% of global production); while wheat production has exceeded expectations by 29M tonnes and maize by 13M tonnes.

Figure 2: Maize and wheat prices, April 2014 to April 2015



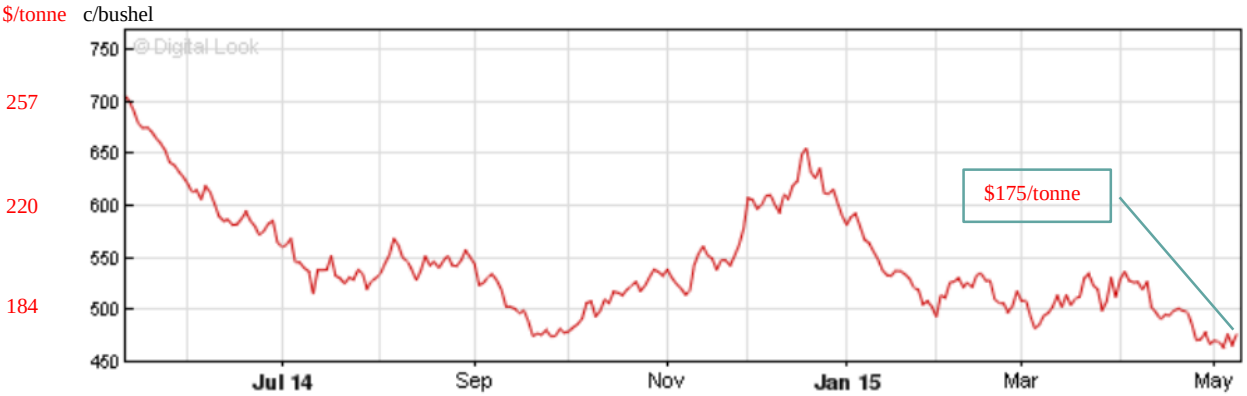
Source: Monthly prices from FAO GIEWS.

Figure 3: Chicago (CBOT) Maize Futures: US cents/bushel, 12 months to May 11, 2015



Source: BBC Market data. US$/tonne added.

Figure 4: Chicago (CBOT) Wheat Future: US Cents/bushel, 12 months to May 11, 2015



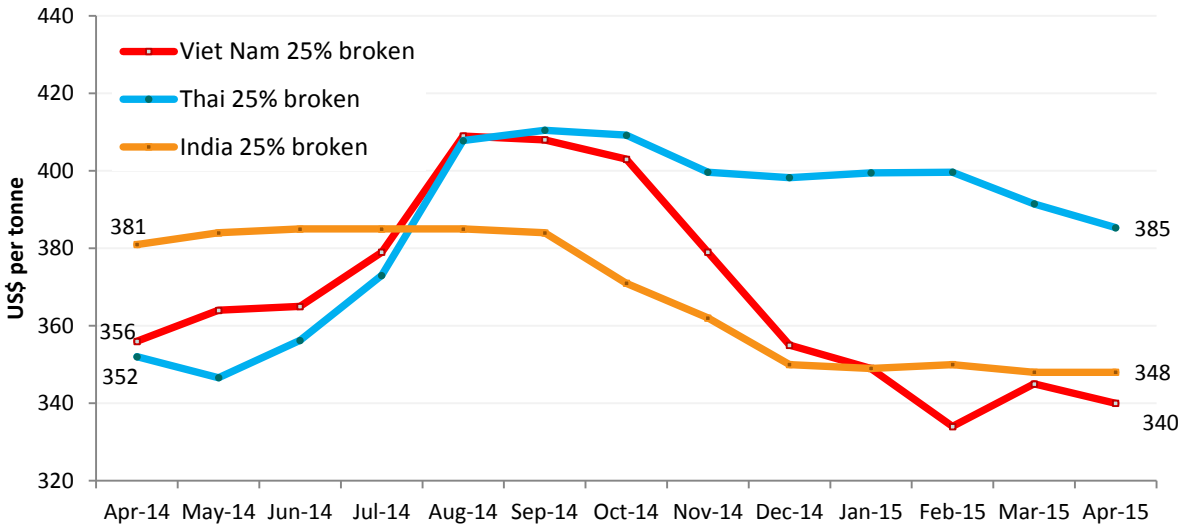
***Source**: BBC Market data. US$/tonne added.*

1.2 World prices: rice

Global rice harvests in 2014/15 were also good, though overall production declined slightly year-on-year, largely owing to drops in India, as well as Thailand, where farmers reduced planting following the end of the paddy pledging scheme and droughts hit harvests. Increased production in Bangladesh, Burma/Myanmar, China and elsewhere did not quite offset these declines. Rice harvests remained however relatively high compared to historical levels and supply was adequate.

Rice prices have changed little since April 2014 (Figure 5). Prices of all three key exporters have hovered around the US$350 to US$400 a tonne mark — well down from the going rates of only a few years earlier of over US$550 a tonne. Thai rice prices that traditionally marked the world price rose from April to September 2014, before falling slightly. Vietnamese prices followed these closely until October 2014, since when they fell. Indian prices were fairly stable from April to October 2014, but subsequently dropped towards Vietnamese levels.

Figure 5: Rice prices, April 2014 to April 2015



Source: Data from FAO GIEWS

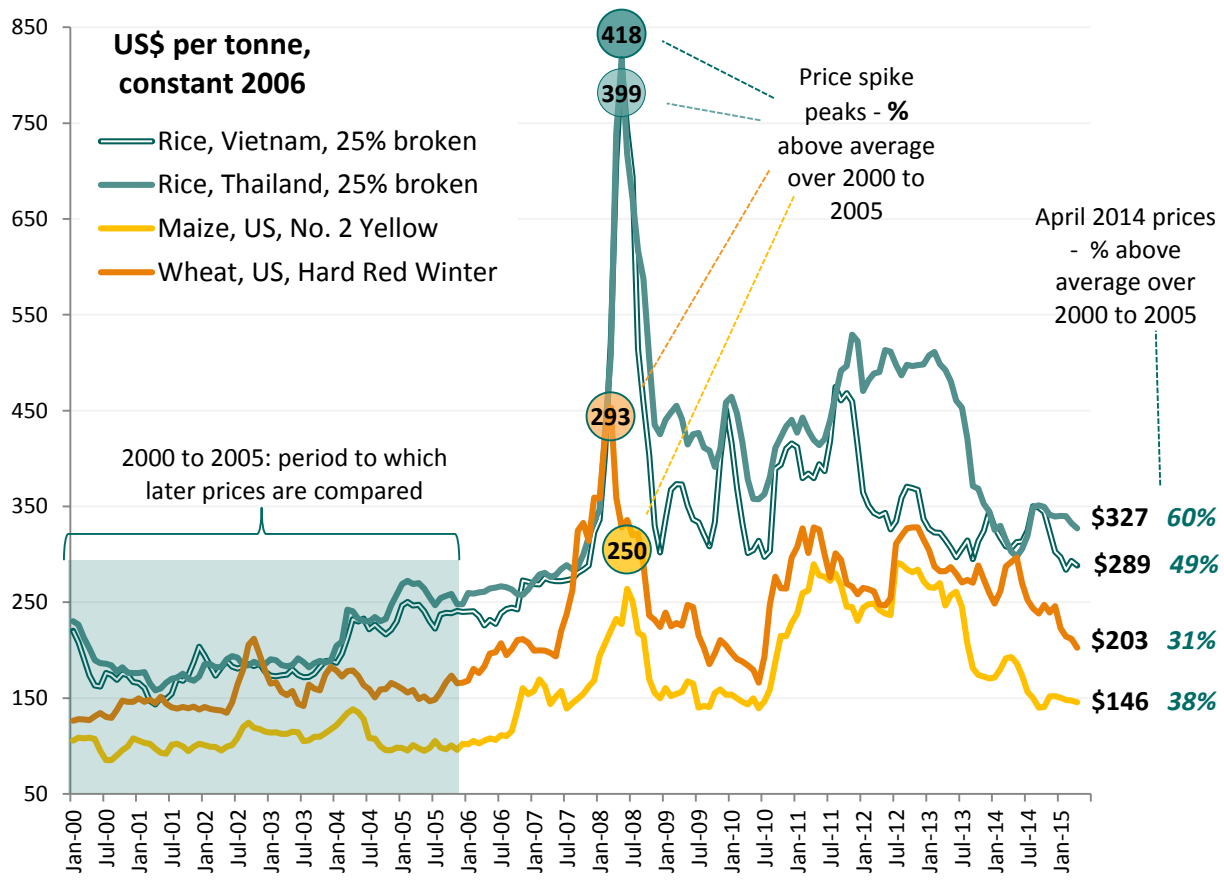
In sum, since April 2014 harvests of the main cereals have been good overall, so that prices have tended to fall since late 2012. With no major surprises to either demand or supply, farmers have continued to market more steadily pushing down prices.

2 Domestic prices under the new equilibrium

2.1 Recap

In the last Annual Review (Wiggins and Keats, May 2014), we argued a new equilibrium in cereals prices[2] had been reached, following a roller-coaster ride of instability since late 2007 that led to a sharp spike in 2008, followed by two more spikes in 2010 and 2012 (see Figure 6).

Figure 6: International maize, rice, and wheat prices, January 2000 to April 2015, constant 2006 US$



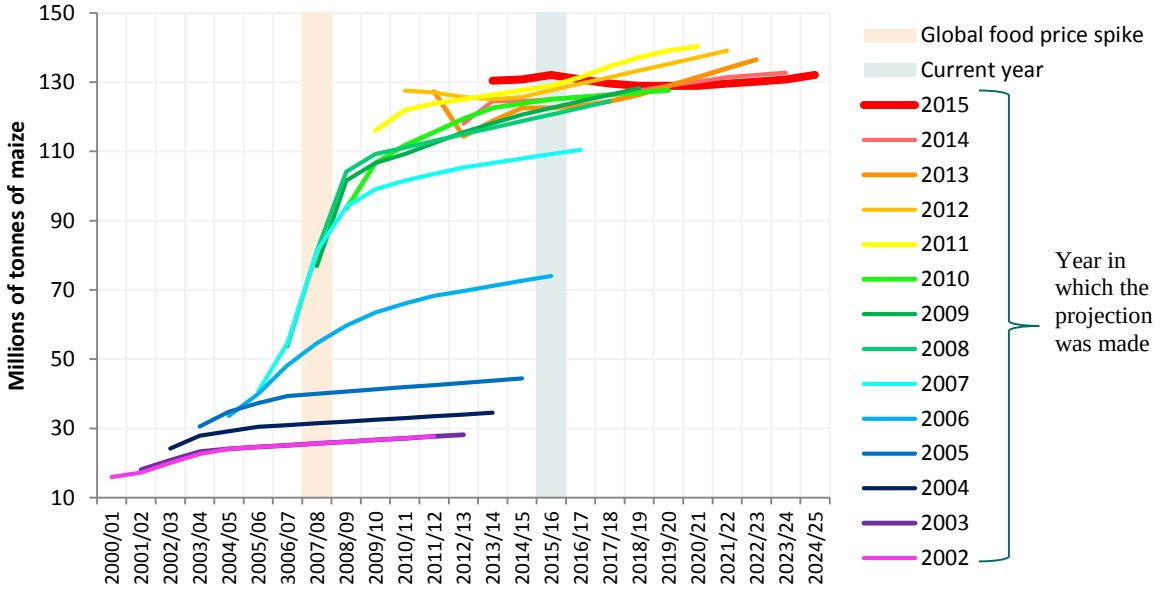
Source: Prices from FAO GIEWS, deflated by US GDP deflator from World Bank, monthly values imputed from annual values

[2] Equilibrium does not mean price stability. When harvests vary, some of the adjustment to consumption will be met by stocks, but prices will move as well. That said, the spike of 2007/08 is unlikely to be repeated frequently: the largest shock to cereals markets seen since 1973/74, it may prove to be a one-in-34-year event.

Price volatility from late 2007 to late 2012 increasingly can be seen not as heralding a new era of increased volatility, but as an adjustment period over which farmers adapted to new circumstances. Chief among these were:

1. Higher oil prices that more than quadrupled in the dozen years to early 2014, thereby driving up costs of operating farm machinery, transporting produce, and manufacturing nitrogenous fertiliser. Conversely, the recent surprising fall in oil prices, by half since late 2014, is expected to dampen food prices — see our bulletin on the impact of lower oil prices on food and agriculture (Wiggins and Keats, March 2015).
2. Growing rural wages across many countries in Asia, with substantial increases since the mid-2000s — see our report on changes in Asian rural wages, Wiggins and Keats (Oct 2014) — which drive up costs of production, particularly of rice.
3. The expansion of US ethanol distilled from maize which consumed just over 30M tonnes of maize in 2005/06, but which rose to over 90M tonnes by 2008/09, and reached around 130M tonnes in 2015/16. The speed and scale of response to US mandated production of renewable transport fuels and to rising oil prices took most observers by surprise, as projections made in the early 2000s proved woefully short of the mark (Figure 7). Current levels of ethanol production, however, are not expected to rise much further since production is close to the blending wall beyond which engines would need to be modified.

Figure 7: Ten-year projections of US maize converted to fuel ethanol since 2002



Source: Projections from USDA ERS Agricultural Baseline Data

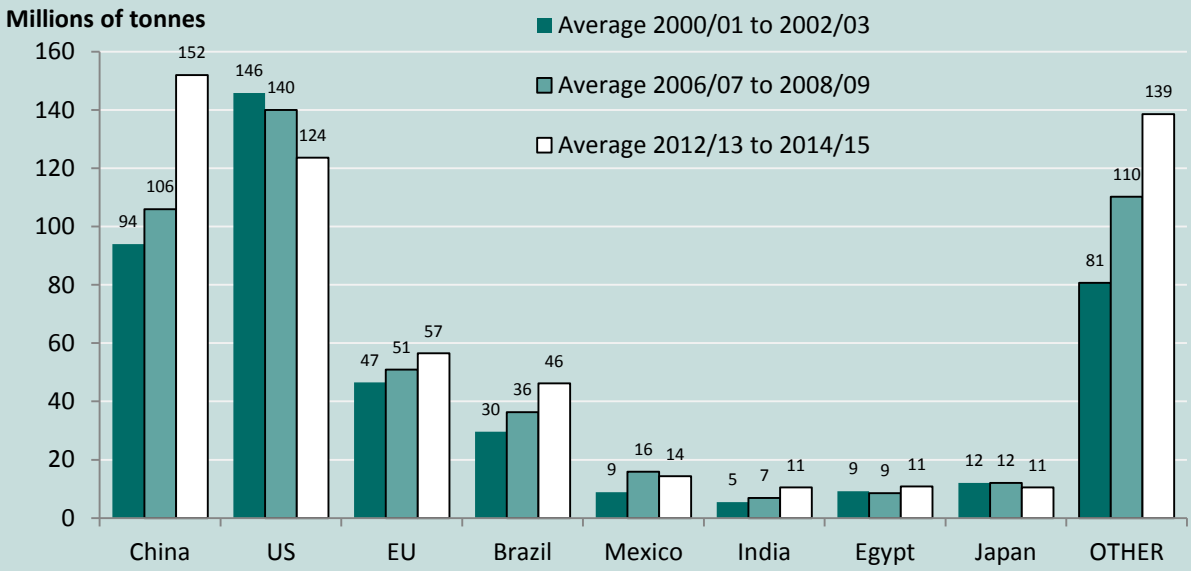
With the recent fall in the oil price and levelling off of demand for US maize ethanol, there are few if any reasons to expect cereals prices to rise over the next five to ten years. Unusual weather — likely to increase in frequency and severity with global warming — such as the drought in the US Midwest in 2012 leading to harvest failures is the most likely risk, but even then with rising stocks of cereals any such events should have limited impact on prices. This is not to imply that significant changes to demand and supply will not occur. Demand for feed grain from growing emerging economies is rising, see Box 1, but not sufficiently to outstrip increases in production.

Box 1: The world's growing appetite for feed grain

Increasing affluence in emerging economies has led to a growing appetite for meat and dairy products, met in large part from grain-fed animals.

Maize is a major feed grain. China has seen the largest increment in consumption over the last six years (46M tonnes), followed by Brazil (10M tonnes), EU (6M tonnes), India (4M tonnes), Ukraine, Indonesia, and Russia (about 3M tonnes each). China has now overtaken the US in use of maize for feed, see Figure 1.1.

Figure 1.1 Maize use for feed in major countries since 2000/01



Source: Data from USDA FAS PSD – Feed and Residual.

China's increased use of maize has changed the country from being a net exporter of feed maize, of around 7M tonnes in 2000/01, to a net importer of around 3M tonnes in 2014/15: a swing of 10M tonnes on a global export market that was in 2014/15 about 120M tonnes.

While China's maize consumption grew on average by around 3% a year between 2000/01 and 2008/09, this average annual growth rate almost doubled to 5.9% a year between 2008/09 and 2014/15: see Table 1.1. Rates of growth in production over the same two periods, however, remained fairly stable.

Table 1.1: Accelerations in maize consumption in China supported by higher net imports

	Average annual % change		Average	
	Consumption	*Production*	Net imports (M tonnes)	Ending stock to use ratio (%)
2000/01 to 2008/09	*3.2*	*5.5*	6.9	42
2008/09 to 2014/15	*5.9*	*5.4*	-2.3	33
	Millions of tonnes			%
	Consumption	Production	Net imports	Ending stock to use ratio
2000	120	106	-7.2	85
2008	153	166	-0.1	51
2014	216	216	2.9	37

Source: Data from USDA FAS PSD

2.2 Domestic cereals prices: where are they now?

So, if international prices are reaching a new equilibrium, how have domestic prices fared over the years since the food price spike of 2007/08?

Price changes in international markets might be expected to transmit to domestic markets. If markets are efficient and policies are not an obstacle to their operation, there would only be a short lag between local and world markets. In reality domestic prices also depend on several factors:

- Local harvests – if hit by weather or conflict, without imports, prices rise;
- Local variable costs of production, largely from labour and input costs;
- Transport costs from farm to market or (in the case of imports) from port to market. In a landlocked country with poor infrastructure, cereals prices will vary within a wide band between import and export parity;
- Public policies. Border measures (tariffs, quotas, bans, taxes), and interventions on domestic markets (stockholding, price controls, subsidies) can insulate local or domestic prices from world markets;
- Trade policies in other countries can also influence domestic prices. The experience of Bangladesh over the price spike is an example. While India's export bans contributed to rice prices rising internationally, their special agreements with vulnerable countries like Bangladesh provided some protection; and,
- Market imperfections. Traders may have monopoly power in markets and manipulate prices to their advantage

Although some countries managed to insulate their cereals markets quite effectively from international volatility during 2008, many countries saw rising prices over the price spike, the exceptions being those insulated by high transport costs, see Box 2.

Box 2: Broad patterns of price transmission over the global price spike of 2007/08

Three broad patterns of transmission can be identified.

1. Very large Asian countries, such as China and India, were insulated from world markets by large (and costly) public stocks and restrictions on trade.

2. Some, mainly low income countries, especially in Africa, were insulated from world markets by high transport costs. In addition little-traded staples such as cassava, yams, millet and sorghum were important in local diets. Food prices thus depended more on domestic harvests than world prices, a tendency exacerbated by restrictions on trading grains with neighbouring countries. In 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.

3. Other developing countries with reasonable access to world markets saw significant if muted transmission to their markets, so that domestic prices of staples rose considerably, in the range 30% to 70%.

Source: Wiggins and Keats, 2013

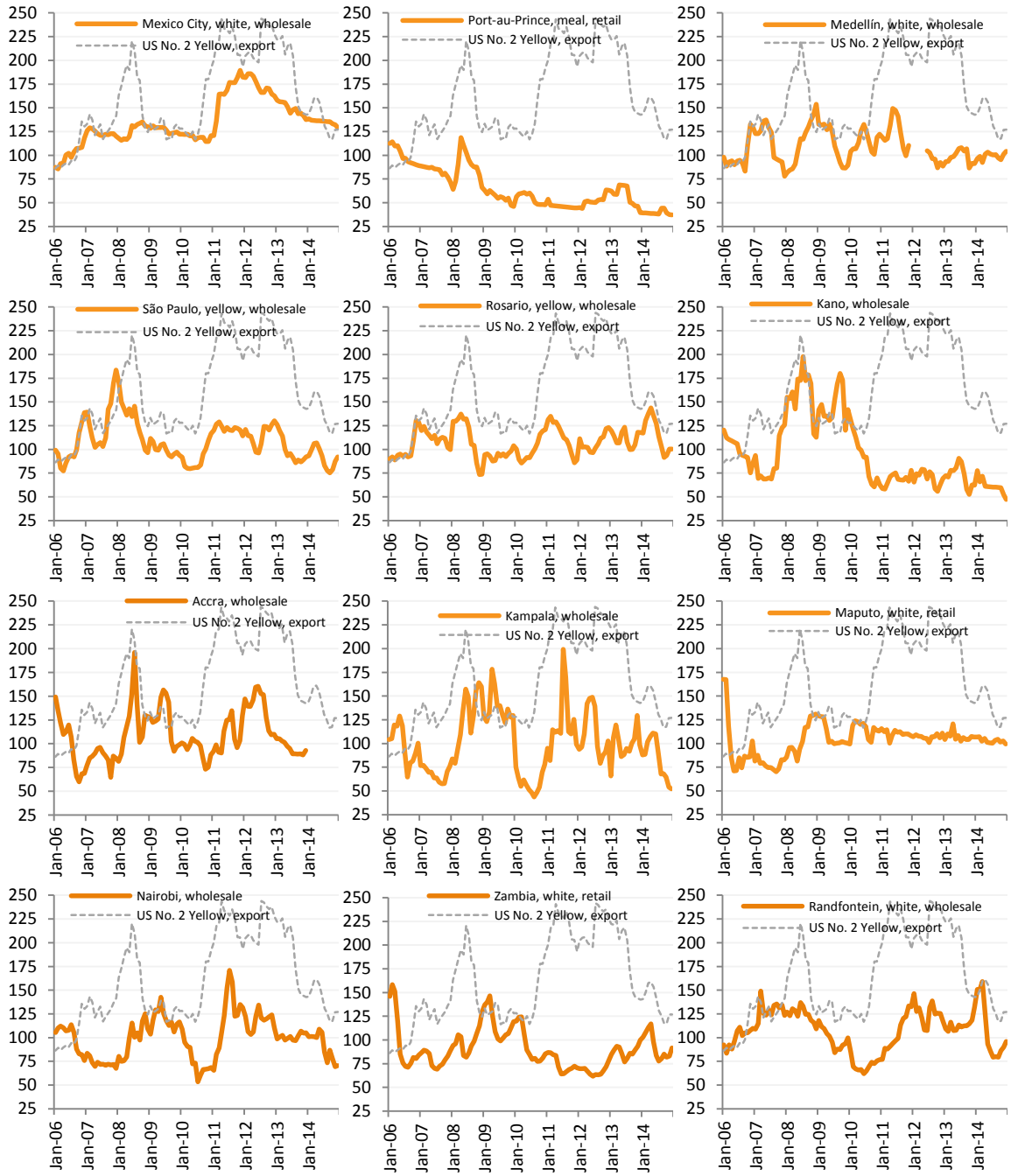
So what has happened to local prices since 2007/08? Price changes in key cereals on local markets have been examined from 2006 to 2014, with prices in local currencies deflated by national GDP deflators to represent constant 2006 prices and indexed so (real) price movements are expressed relative to their levels in 2006, see Figures 8, 10, and 12.

Local maize prices, 2006 to 2014

Where people commonly consume maize as a staple, Latin American and sub-Saharan Africa, similar patterns to changes in world prices can be seen, even if with some substantial local variations (Figure 8). Three points stand out:

- Where maize prices spiked, in 2008 and beyond, increases were muted compared to those seen for US export maize;
- In several markets in sub-Saharan Africa, local factors such as harvest failures, or perhaps pass-through of the concurrent sharp oil price peak likely affected local maize prices more than transmission from world maize prices; and,
- In most cases, maize prices were lower in real terms in 2014 than in 2006

Figure 8: Maize price indices (2006=100) for selected countries in LAC and SSA, constant 2006 prices, Jan 2006–Dec 2014



Source: Monthly price data from FAO GIEWS from Jan 2006 to Dec 2014. Monthly prices in local currencies have been deflated to constant 2006 terms using national GDP deflators, from World Bank WDI, then indexed to 2006 levels so the vertical axis represents % of price in 2006.

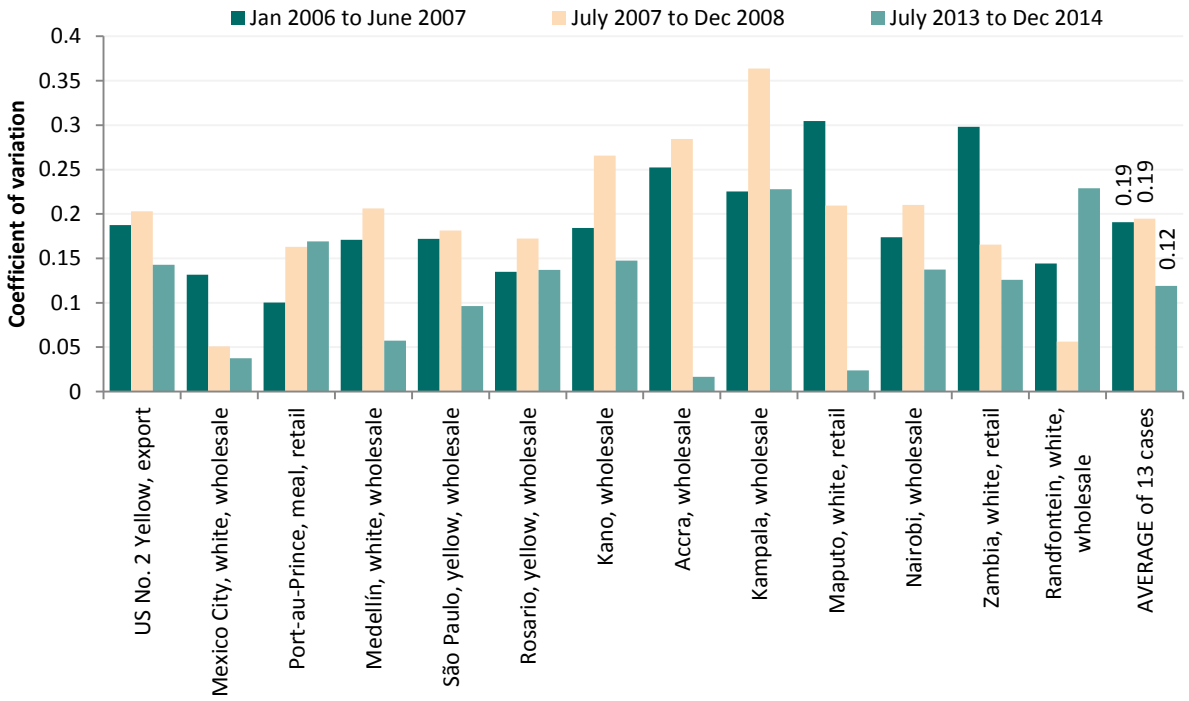
Did domestic price volatility increase as a result of the spikes in international prices in 2007/08? Some maintain that food prices have remained high and become more volatile since the spike (McNair 2012).

Changes in the coefficient of variation — ratio of standard deviation to the mean — in monthly prices before (January 2006 to June 2007), during (July 2007 to Dec 2008) and after the spike (July 2013 to Dec 2014) have been computed (Figure 9). In most countries, volatility increased during the spike: although not always by that much. Average volatility increased fractionally during the spike from that beforehand. More striking is that the most recent period has seen markedly less volatility in nine out of the thirteen countries. Only in Haiti and South Africa did volatility increase significantly from the early to latest period.

Highest levels of volatility appear in domestic African examples. In all the African cases except for South Africa, volatility has fallen from the early to latest period. This is consistent with findings of declining volatility in Africa reported in studies such as Minot, 2013:

"The widespread view that African food prices have become more volatile may be just a misconception that has been reinforced by repetition in the media."

Figure 9: Maize price volatility before, during and after the 2007/08 price spike



Source: CVs calculated using monthly price data from FAO GIEWS from Jan 2006 to Dec 2014. Monthly prices in local currencies were deflated to constant 2006 terms using national GDP deflators, from World Bank WDI, and indexed to 2006 levels.

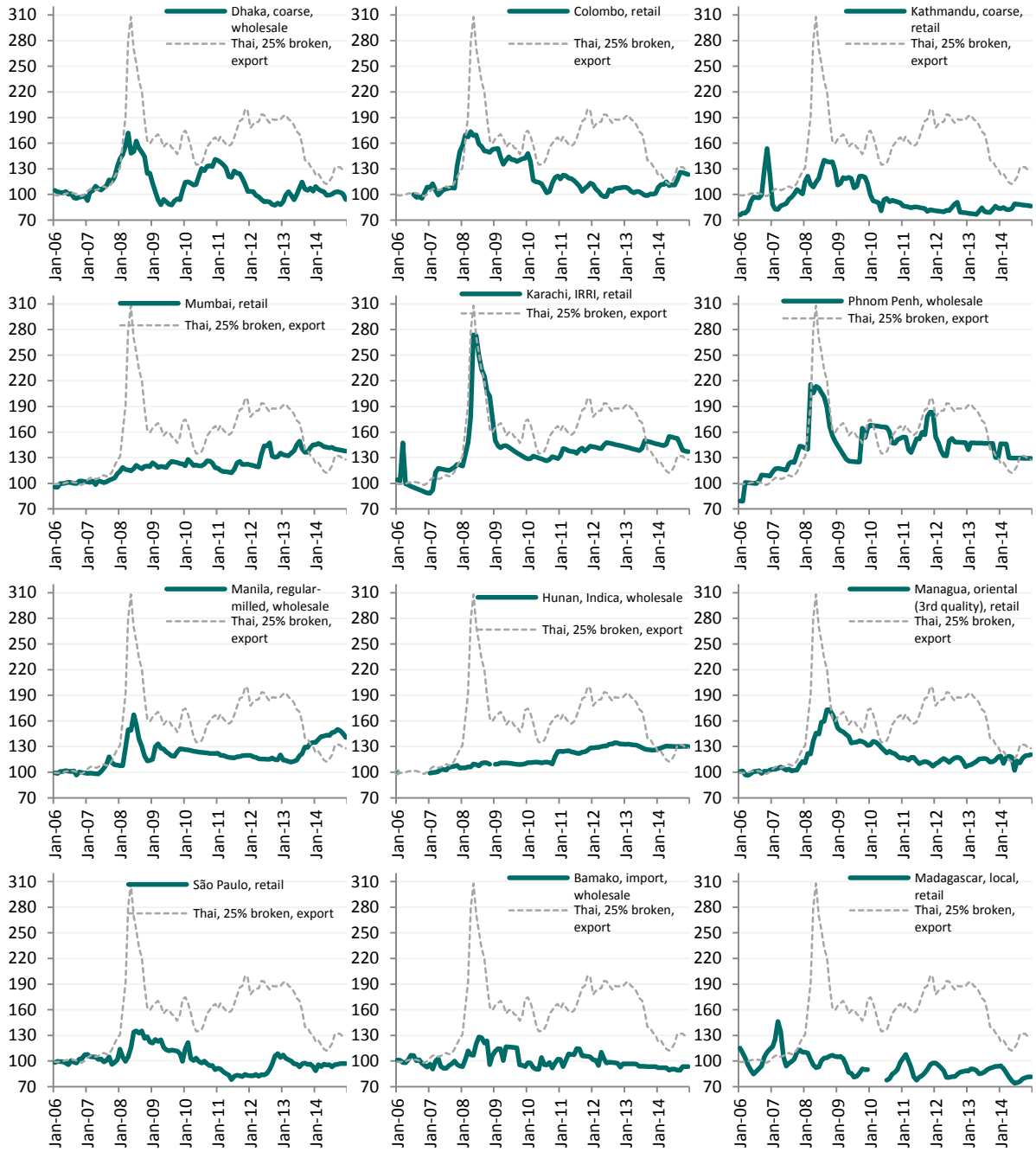
Local rice prices, 2006 to 2014

For rice prices across the developing world (Figure 10), four points stand out:

- In Asia, the rice spike in 2008 transmitted to all markets, with the notable exceptions of India and China which used large stocks and controls on exports to isolate domestic markets. These countries have subsequently seen slow but steady rises in their real rice prices;
- Where spikes were observed in 2007/08 they were muted compared to rises in Thai export prices, except for Pakistan. Although Thai prices remained high for many years, owing largely to guaranteed purchase and stocking policies intended to benefit Thai farmers (see Box A of Wiggins and Keats, April 2013), in many other locations, prices fell after 2007/08;

- The two African examples show the least obvious price pass-through. In Madagascar, a small net-importer, local factors dominated, with strong seasonality evident in regular peaks in lean seasons and troughs at harvest time; and,
- Comparing prices in late 2014 to those seen in 2006, about half of the sampled locations had lower prices, while half had higher prices. Interestingly, domestic Bangkok prices were almost 10% lower than their 2006 levels by the end of 2014, though Thai export prices were about 30% higher. China, Pakistan, India, and the Philippines saw greater increases from their 2006 levels by the end of 2014 than did Thai exports.

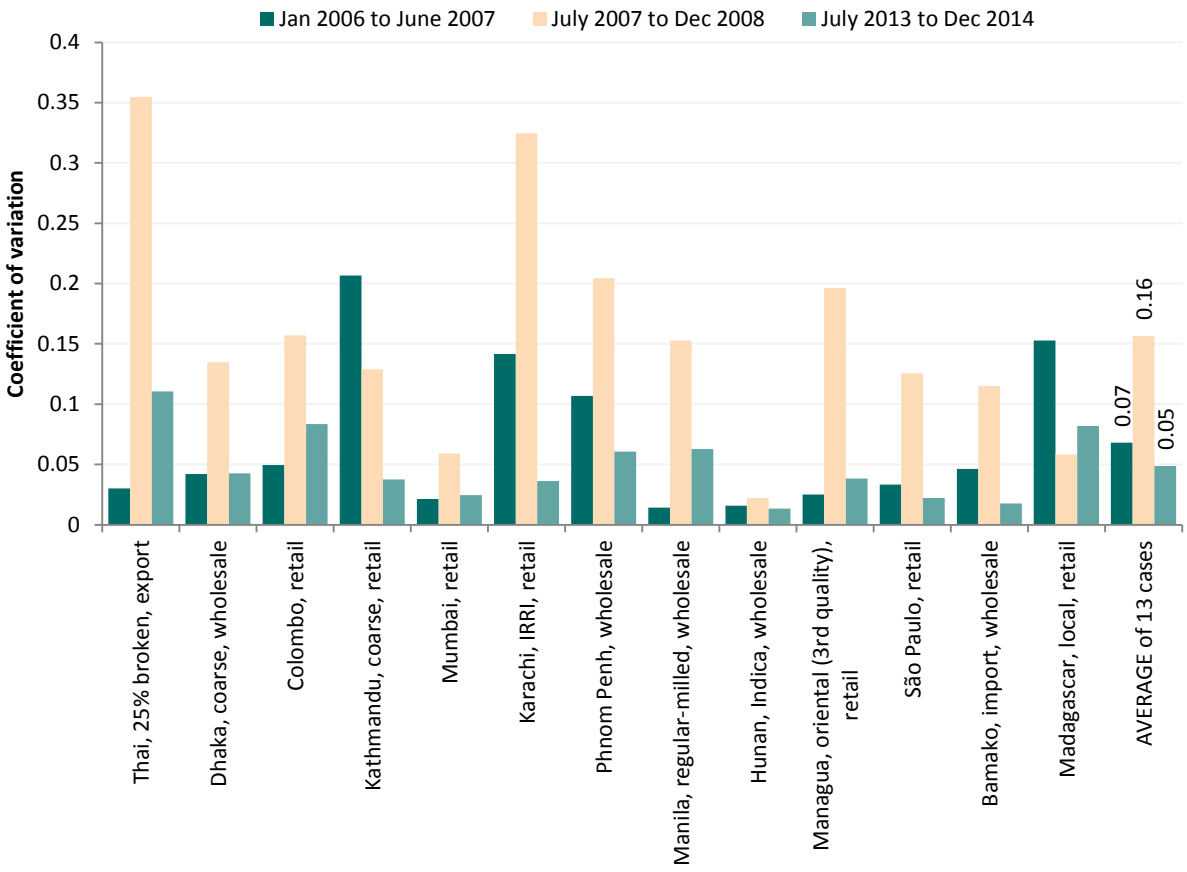
Figure 10: Rice price indices (2006=100) for selected countries in Asia, LAC, and SSA, constant 2006 prices, Jan 2006–Dec 2014



Source: Monthly price data from FAO GIEWS from Jan 2006 to Dec 2014. Monthly prices in local currencies have been deflated to constant 2006 terms using national GDP deflators, from World Bank WDI, then indexed to 2006 levels so the vertical axis represents % of price in 2006.

What about rice price volatility? In all cases other than Nepal and Madagascar, volatility increased during the spike (Figure 11). Volatility then fell back, in most cases to less than it what it was before the spike. Other than during the spike, volatility in rice markets was well below levels seen in maize markets, especially so in China.

Figure 11: Rice price volatility before, during and after the 2007/08 price spike



Source: CVs calculated using monthly price data from FAO GIEWS from Jan 2006 to Dec 2014. Monthly prices in local currencies were deflated to constant 2006 terms using national GDP deflators, from World Bank WDI, and indexed to 2006 levels.

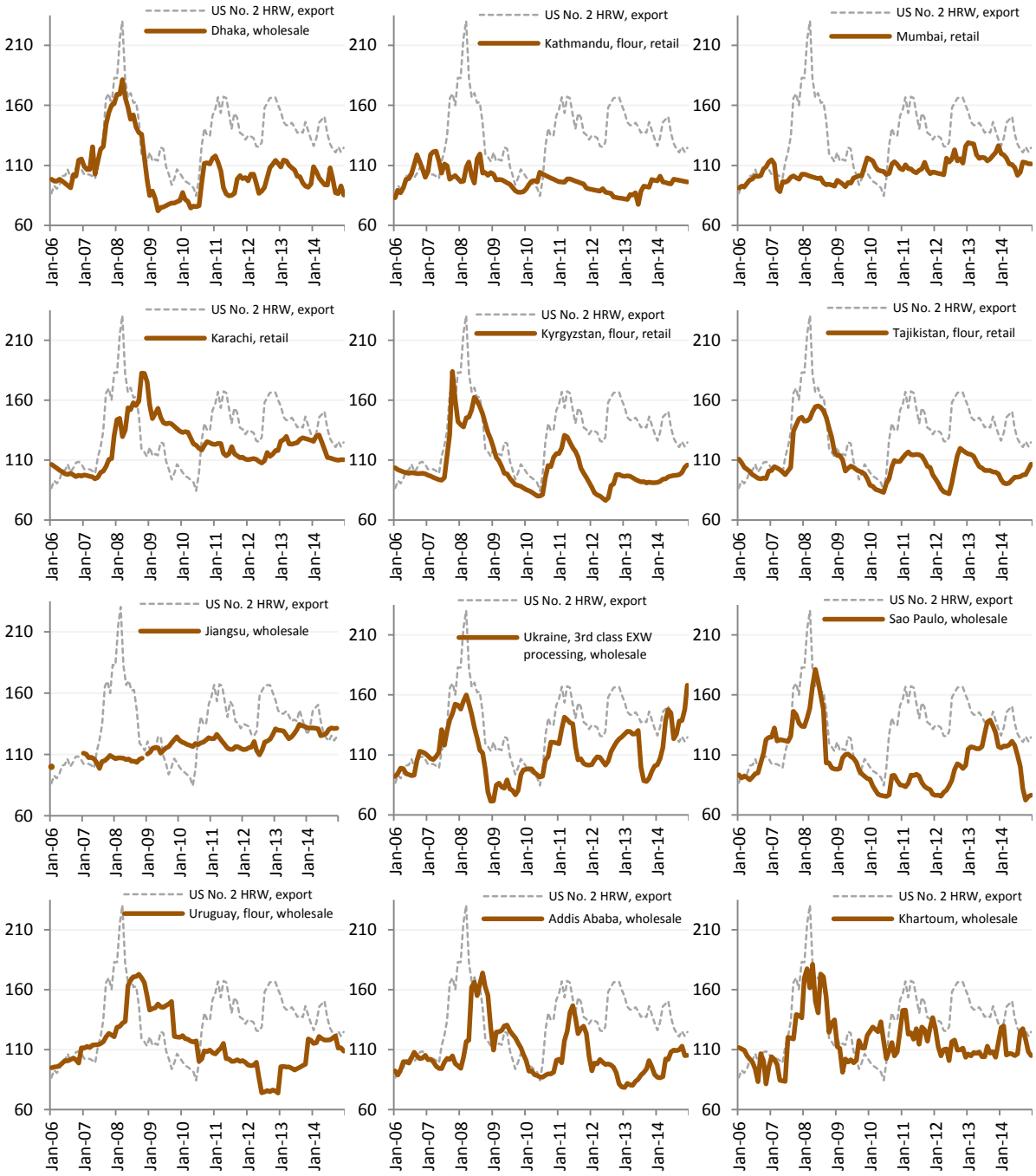
Local wheat prices, 2006 to 2014

For wheat prices (Figure 12)[3] three points stand out:

- In Asia, India and China again notably controlled prices. Nepal saw an earlier rise in prices, largely independent of US price movements. Countries that significantly depended on wheat imports, such as Tajikistan, Bangladesh, and Kyrgyzstan, saw significant spikes over the 2007/08 period;
- In the 5 to 6 years shown after the 2007/08 price spike, nowhere did prices rise to quite the same extent for quite as long as US wheat export prices; and,
- Most locations saw higher real prices by the end of 2014 compared to 2006, although for the most part the increases were modest, by less than 12%. China saw higher price rises, as rising wages and input costs pushed prices up by 30% on their 2006 levels.

[3] Price series the north of Africa were not readily available for the full period on GIEWS.

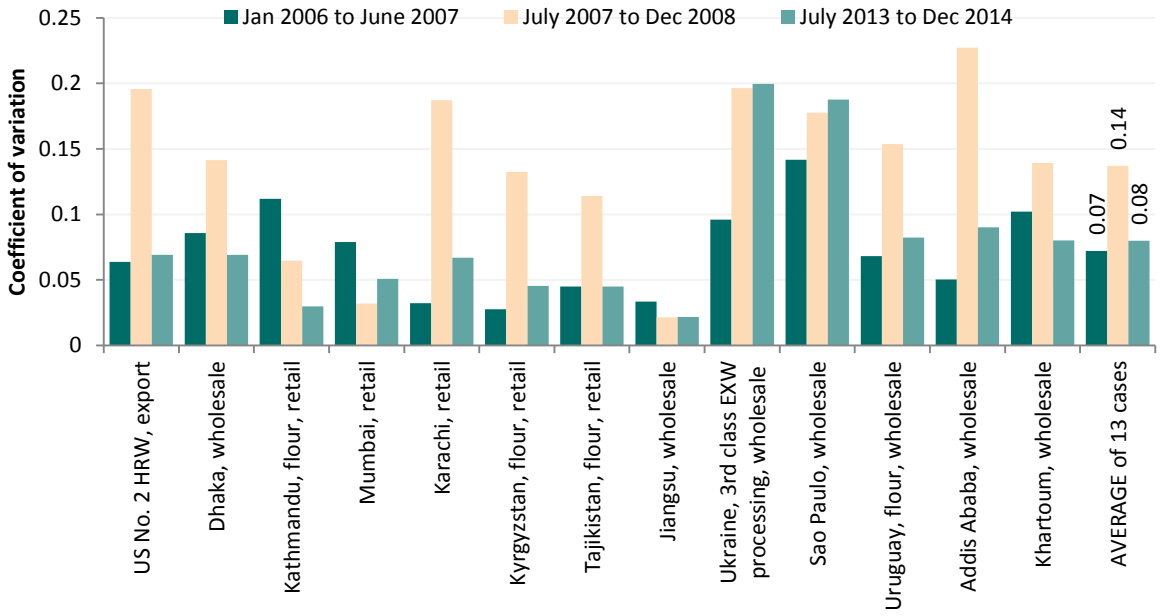
Figure 12: Wheat price indices (2006=100) for selected countries in Asia, Europe, LAC, Africa: Constant 2006 prices, Jan 2006–Dec 2014



Source: Monthly price data from FAO GIEWS from Jan 2006 to Dec 2014. Monthly prices in local currencies have been deflated to constant 2006 terms using national GDP deflators, from World Bank WDI, then indexed to 2006 levels so the vertical axis represents % of price in 2006.

Wheat price volatility increased during the spike in 11 out of 13 countries (Figure 13). Only in Nepal and China was volatility in 2007/08 lower than over 2006/07. Since the spike, volatility has decreased, although only to levels below that seen before the spike in 5 countries. In contrast to maize and rice markets, in more cases recent volatility has been greater than that seen before the spike.

Figure 13: Wheat price volatility before, during and after the 2007/08 price spike



Source: CVs calculated using monthly price data from FAO GIEWS from Jan 2006 to Dec 2014. Monthly prices in local currencies were deflated to constant 2006 terms using national GDP deflators, from World Bank WDI, and indexed to 2006 levels.

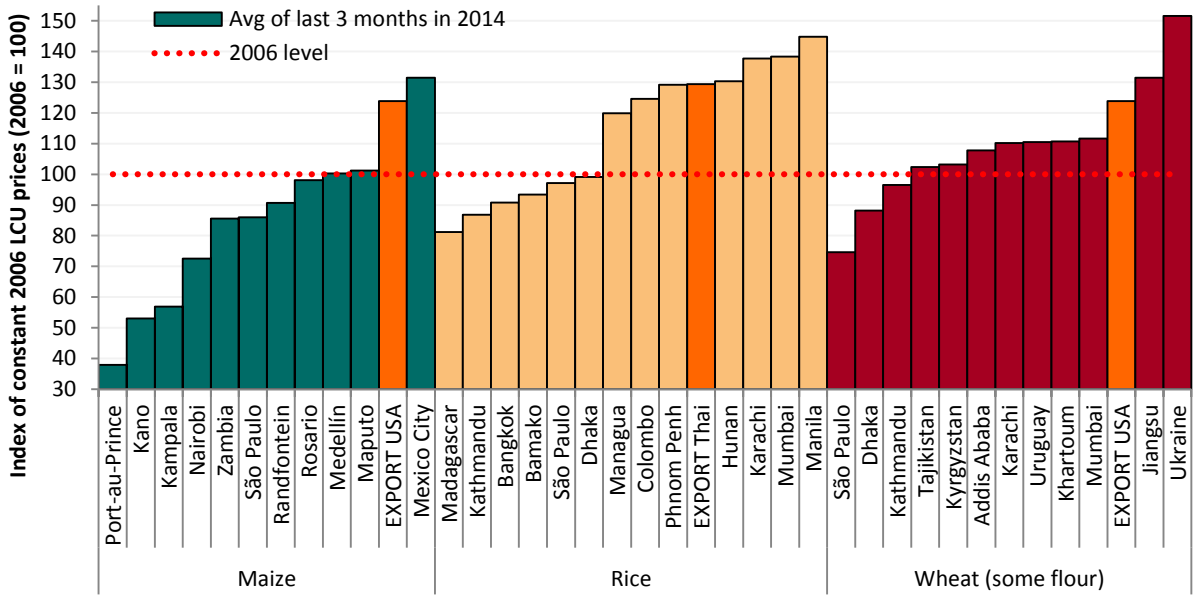
Summary

While international prices may be achieving a new equilibrium, some domestic markets remain significantly insulated from the world market. Their prices are determined to a greater extent by local harvests, as in much of sub-Saharan Africa, or by concerted domestic policy to control prices, as exemplified by China and India.

Where domestic prices did rise at the time of international price spikes, the increases were in most cases usually considerably muted compared to changes on international markets.

Since 2007/08 domestic prices for cereals have fallen back, but not always to their levels before the spike. Comparing prices in the last quarter of 2014 to those in 2006 (Figure 14) shows that in 11 out of 13 countries maize prices in constant terms had fallen back to, or below, their 2006 levels. For rice, prices fell back to 2006 levels in six countries, but were higher in seven countries. For wheat, only three countries had seen domestic prices fall back to 2006 levels. In most cases domestic prices had fallen by more than the international price.

Figure 14: Real prices in the last 3 months of 2014, compared to their 2006 levels (%)



Source: Price data from FAO GIEWS, local GDP deflators from World Bank WDI. For more detail see notes to Figures 8-10

The degree of price volatility in domestic cereals markets varied considerably across countries. Simple averages across the countries, however, suggest that on balance domestic prices have been less volatile than international prices, especially during the 2007/08 price spike.

These findings are similar to those of Dawe et al. (2015) who examined domestic prices of the three main grains for 59 low and lower-middle income countries. They report that consumption-weighted averages of real domestic prices in 2013 were higher than those in the first half of 2007 by 29% for maize, and by 19% for both rice and wheat. Differences arise from considering prices in late 2014 rather than 2013, at a time when prices on world markets, and many domestic markets, was falling.

3 Did high prices harm children's nutrition?

When prices of key staple foods rise rapidly, people living on low incomes who spend much of their income on food can struggle to feed their families. They typically cope by switching spending from non-food items, substituting cheaper for more costly foods, reducing how much is eaten, depleting savings and so forth. The fear is that with large price rises, coping will only partly succeed and that their children's nutrition will suffer. Early reports from field studies, see for example Box 3 on Bangladesh, and a synthesis of such early reports (Compton et al. 2010) suggested as much.

Box 3: Reported impacts of higher food prices in Bangladesh

Real rice prices spiked about 70% in 2008 in Bangladesh, declined by mid-2009, but spiked again in 2011 by about 50% — see the first panel in Figure 9 (section 2) for wholesale rice prices trends in Dhaka. Not only staples, but also prices of most other foods — protein, vegetables, and cooking oil — also rose, along with non-food essentials like cooking fuel, transport, and rent (Hossain and Green, 2011).

The poorest quintile in Bangladesh spent just over 60% of their food budget on rice in 2008, compared to just under 50% in 2006, thereby shrinking their budget for complementary food items of potentially greater nutritional value (Matin et al., 2009)

Accounts of serious hardship from rural and urban Bangladesh (Heltberg et al., 2012)

- "Severe food insecurity was also common… respondents often complained of weakness, dizziness, and lack of energy due to poor diets"
- "Some respondents… reported postponing serious medical treatment."
- "Drop-outs were particularly acute... The head teacher in an NGO-run school in Dhaka reported that "On average if we had 30 students in every class, then we lost five students in every normal year. But this year 10 to 15 students have dropped out from every class of our school.""
- "…people reported selling electronic equipment and mobile phones."
- "Women beggars… felt that the norm of assisting the extreme poor had been destroyed…with better-off people abusing them and advising them rudely to seek help from the government or NGOs."
- "Indebtedness to microfinance institutions and informal moneylenders as well as inability to serve those debts was a major source of distress... interviewees complained that families had to go without food for days in order to continue making weekly repayments to microfinance institutions"
- "In rural Bangladesh, recipients of the old age and widows' allowances complained that the transfers (between Tk 200-–300) were grossly inadequate because of food price hikes".
- "Even formal sector workers… whose wages rose with the revival of the export sector felt that income increases did not fully compensate for food price inflation."

So what is now known about the impacts of the price rises that began in late 2007? Have those early reports been confirmed?

3.1 Impacts of the 2007/08 food price spike on nutrition

Relatively few studies, summarised in Table 1, observe food intake and nutrition before and after 2007/08. Most of these few reports indicate that higher food prices did indeed result in poor and vulnerable people reducing their food intake, with their children showing worse nutrition as a consequence. Exceptions arise where increases in income, in some cases from remittances, offset the effect of higher prices.

However, only six studies reporting observations from seven countries could be found. With such a slim sample, it is possible that these cases do not reflect more generalised tendencies. To gain a wider vision, we examine the record of national surveys of child nutrition.

3.2 Stunting of young children before and after 2007/08

If higher prices did result in widespread poorer malnutrition is it should show up in national-level statistics. Child stunting is taken as the measure, since stunting represents nutrition deficits with serious long-term consequences for mental and physical development of the child. Food intake is only one determinant of stunting: child care and health are equally important; but it is a large enough determinant to expect that less food intake, or poorer quality food, would lead to increasing stunting. So what may be inferred from changes in stunting prevalence of under-fives from surveys before, during, and after the 2007/08 spike?

Statistics from Demographic and Health Surveys (DHS) were found for 43 countries[4] with high rates of stunting in the final survey: more than 30% of under-fives stunted is considered high by the World Health Organisation. At first sight, the results shown in Figure 15 reassure: in all but eight countries, stunting was ***lower*** after the price spike than before. This seems to suggest that higher food prices did not harm children's nutrition in the great majority of countries; a result at odds with expectations.

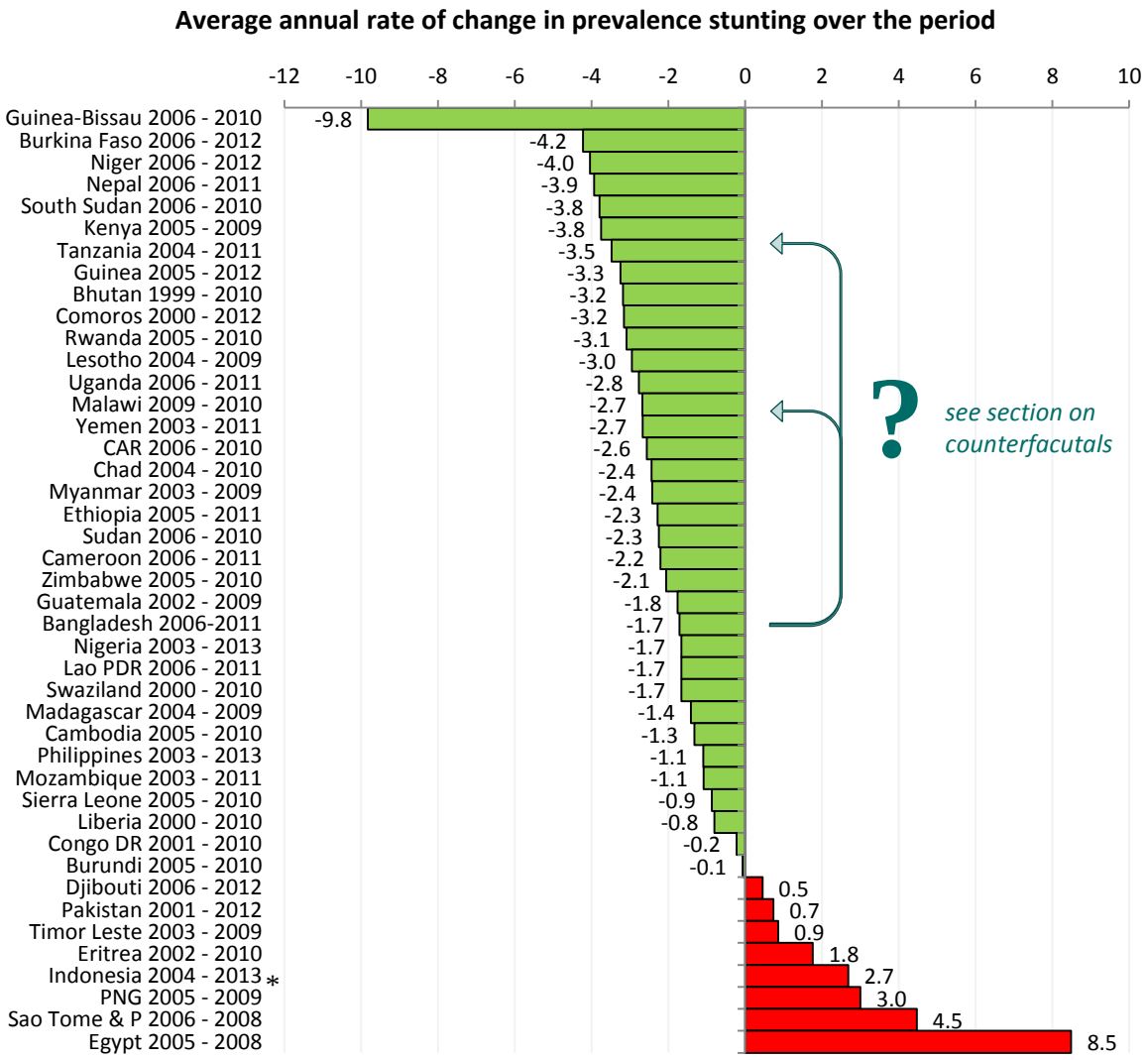
Without a counterfactual, however, it is hard to tell if these reductions would have been faster in the absence of the price spike. We thus construct simple counterfactuals for ten countries to see if stunting rates might have taken a different path in the absence of a price spike.

[4] In all statistics can be found for 97 countries, including countries with lesser rates of stunting. Figure B1 in Annex B shows average annual percent change in under-five stunting prevalence over two surveys straddling the 2007/08 price spike.

Table 1: Some impacts on food and nutrition of the 2007/08 food price spike

Aims	Country, Data	Method of analysis	Key results	Reference
Link between food price changes and nutrition of children	India; children in Andhra Pradesh 2002, 2006, 2009; 12 key food prices	Anthropometric (child wasting – weight for height) and food prices compared at district level	(Nominal) food prices increased steadily from 2000; had more than doubled by 2006 Per capita food intake fell 19% and 18.4% of children were wasted in 2002 and 2006 respectively, increased to 28% in 2009 Food price increases found to relate significantly to the odds of children being wasted	Vellakkal et al., 2014
Impacts of food price increases on nutrition	Nepal, Dhanusha District. 2006 baseline; surveys of food prices in 2008, 2009; Income levels 2005, 2008	Minimum cost of a nutritionally adequate diet estimated using linear programming. Incomes and nutrition examined	Poorer households unable to afford nutritionally adequate diet both in 2005 and 2008. Nutrition not found to deteriorate significantly over the period, owing to the buffering of concurrent increases in household incomes.	Akhter, 2013
Impact of food price changes on people's diets	Burkina Faso, Ouagadougou. Food price surveys, spending and consumption July 2007 and July 2008.	Changes in food prices calculated, compared to changes in people's diets	Food prices rose, especially of fish (113%), cereals (53%), and vegetable oil (44%), raising average household monthly food expenses by 18%. While 33% of households were food secure in 2007, only 22% were in 2008. People ate fewer fruits and vegetables, dairy products, and meat/poultry in 2008 than in 2007: overall dietary diversity declined.	Martin-Prevel et al., 2012
Effect of staple food price rises in 2008/09 on urban consumers' food access	Zambia and Kenya, urban. Data on relative affordability of foods through time	Purchasing power in 2009/09 was compared to earlier periods, particularly in light of a 20 year trend of rising per capita incomes.	At the start of 2007, bread and maize meal were 1.0 to 4.3 times more affordable than they were in the mid-1990s. These gains were cut over the food crisis but did not completely erode. Between 2007 and 2009, maize meal and bread were still more affordable in urban Zambia than in all the years between 1994 and 2003. In urban Kenya, however, results were more mixed: some indicators suggesting 2008/09 levels of affordability were comparable to levels seen over 2000/01–2004/05; others suggesting 2008/09 was worse for food purchasing power than at other time from 1994/95 to 2007/08.	Mason et al., 2011
Link between early childhood nutrition and cognition	Peru, pre-school aged children (4 to 5 years) and sibling nutrition	Nutrition of siblings within households in 2009 compared	It might have been expected that younger siblings would have been more vulnerable to malnutrition from price rises in from 2006 to 2008, but in fact younger siblings were found to be better nourished on average than their older counterparts. Possible reasons assessed as follows: "Their better nutrition is possibly a reflection of being born at a later stage of the household's life-cycle, benefiting from improved economic conditions, or simply the results of a secular trend. They could also be linked to improvements in access to health services and nutritional programs at the community level."	Outes et al., 2012
Role of migration to cope with food price rises	Ecuador, height-for-age in children under three	Height-for-age of children compared across households with and without migrants	Food prices rose 15% in 2008 in Ecuador Height-for-age scores in children under 3 were found to decline by 0.2 standard deviations on average; but children in households with access to international migrants experienced much lower declines	de Brauw, 2011

Figure 15: Average annual change in proportion of stunted pre-schoolers, 47 country cases spanning the global food price crisis of 2007/08



Source: Joint Malnutrition Estimates database (2014) from UNICEF, WHO and the World Bank. Note: Countries with a data point prior to 2007/08 (closest to 2006 chosen) and from 2008 to 2014. Countries are those with rates of stunting >30% of under-fives at the latest survey.

Note: Value for Indonesia is more likey to be a small positive increase, as the data used to calculate the 2004 value is, upon closer inspection, probably not nationally representative. This is explained under the Indonesian stunting counterfactual.

3.3 Stunting counterfactuals in ten countries

Counterfactuals were constructed by looking at trends seen in stunting before and after the food price spike. In practice that meant that only countries with three or more stunting statistics in the ten years before 2008, and at least one after 2008 or after could be studied.[5] In addition, only countries with data on food price changes were considered.

[5] Including countries with lower levels of stunting than shown in Figure 15. Countries with highly volatile stunting were excluded for lack of confidence in drawing trends across few and volatile data points; for example Kenya, Uruguay and Tajikistan. Other countries were excluded (e.g. DPRK, Malawi) as staple food prices going back to 2006 were not readily available to compare with 2008 and 2011 prices). Finally, cases with a long gap in stunting data over the crisis were excluded (Guatemala, though it has 3 data points in 10 years before 2008 is one of these, since these points are clustered in the late 1990s/early 2000s).

These criteria admitted ten countries: from Asia, **Bangladesh**, and **Nepal** in South Asia, **China** in East Asia, and **Indonesia** and **Vietnam** in SE Asia; from West Africa, **Burkina Faso**, **Ghana**, **Niger**, and **Nigeria**; and from Latin America, **Peru**.

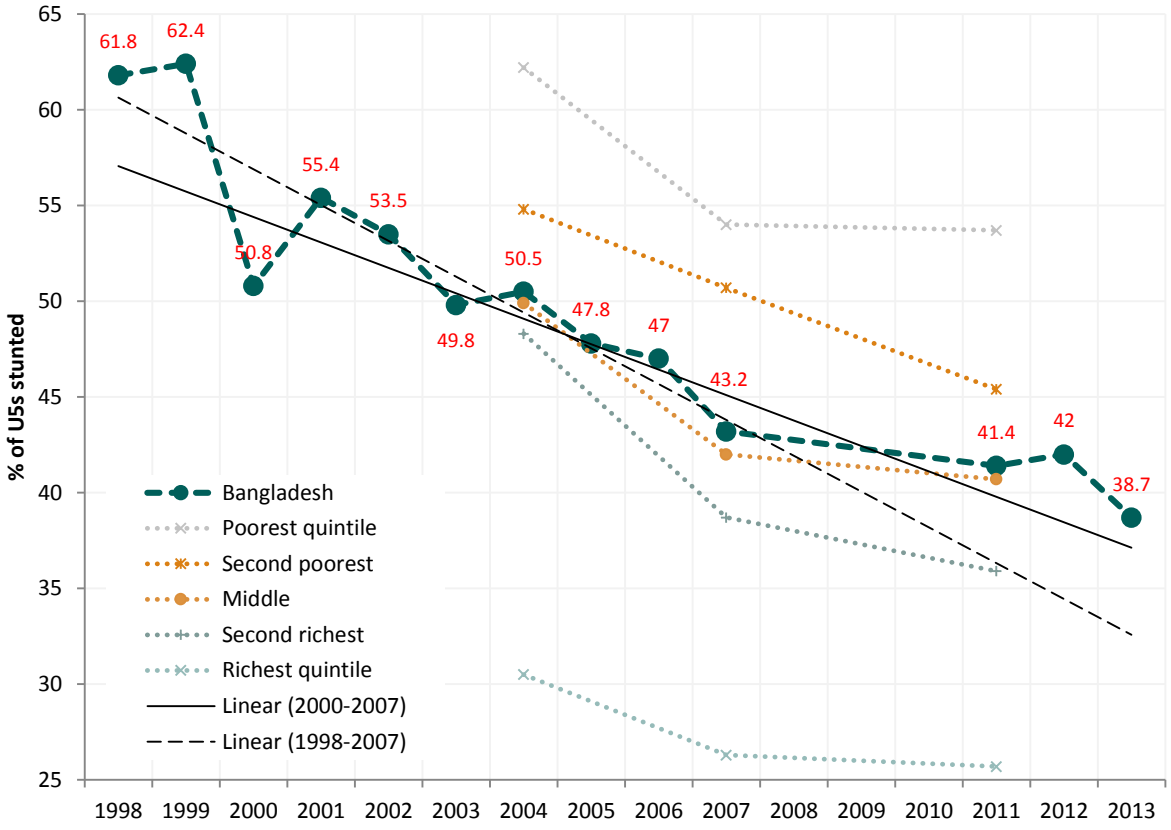
South Asia

1. Bangladesh

Child stunting fell fairly rapidly in Bangladesh between 1997 and 2011 from 62% to 39% (Figure 16). Rapid gains in wealth and strong improvements in parental education were the two key drivers; with health, sanitation, reduced fertility rates and longer birth intervals playing significant secondary roles (Headey et al. 2015).

Despite progress, declines in child stunting visibly slowed after 2007. From 2000 to 2007 stunting declined at annual average of 2.7% a year, between 2007 and 2011 it fell by about 1% a year. Had the former rate been maintained, then instead of the 41.4% stunting observed in 2011, the rate would have been 39%. The difference equates to potentially 305,759 fewer stunted pre-schoolers: the difference between 6.27 million and 5.96 million stunted under-fives, based UN medium variant population estimates. By 2013 the difference between levels expected from previous declines in stunting of about 37% and the observed 38.7% still equated to a difference of 258,985 under-fives stunted. Hardship caused by high food prices is a plausible driver for the differences seen.

Figure 16: Stunting in Bangladesh and rates of decline, 2000 to 2011



Source: World Bank WDI,WHO Child Growth Database for the final 2 points, DHS statcompiler for trends by quintile
Note: 2012 value is for Dec 2012 to Apr 2013, while the 2013 value is for May to July 2013

A more dramatic counterfactual might also be proposed, by including stunting data from 1998 and 1999 in the linear trend taking a 10-year rather than 8-year trend. Under this scenario, rates of stunting might have fallen by on average 3.6% per year, to below 33% by 2013, see the dashed black line fitted on Figure 16. This is equivalent to potentially 825,548 fewer stunted children in 2011 and potentially 945,186 fewer in 2013.

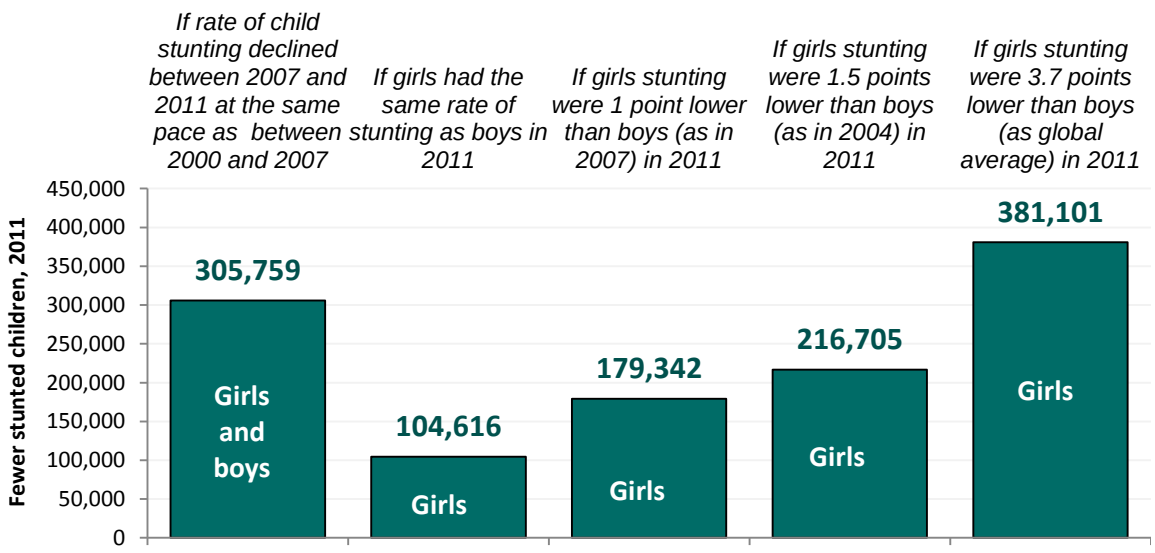
For three surveys in 2004, 2007, and 2011, stunting by income level is also available. For most quintiles, the deceleration of progress in reducing stunting between 2007 and 2011 is apparent, and especially so for the poorest quintile. Somewhat surprisingly, however, the second-poorest quintile shows no deceleration in trends over this period.

A striking feature of stunting in Bangladesh is the difference between boys' and girls' levels, with some indication that bias against girls worsened over the period of the crisis. In 2011, 40.6% of boys in Bangladesh were stunted, compared to 42% of girls (DHS statcompiler). While a small difference on the face of it, considering young boys are more naturally susceptible to malnutrition, this figure stands out. On average, male stunting across a sample of 111 DHS surveys worldwide was around 3.7 percentage points higher than that of females, see Box 4. This puts Bangladesh in 2011 more than two standard deviations away from the international mean.

Previous surveys of Bangladesh in 2004 and 2007 saw smaller deviations from the international mean difference (between -1 and -2 standard deviations away in 2007 and just within the -1 standard deviation range in 2004), indicating that female disadvantage worsened when food prices rose. By the 2013 survey, this discrepancy had shrunk[6], so that girls stunting was some 1.8% lower than boys (37.8% compared to 39.6%): while still worse than the global average, the difference is much less marked.

Some counterfactuals for Bangladesh are shown in Figure 17. In 2011, if girls' stunting levels were the same as boys', some 105,000 fewer children would have been stunted. If girls' levels were 1% below those of boys' — as they were in the 2007 DHS survey, some 179,000 fewer girls would have been stunted, while if girls' stunting levels were 3.7% — the global average — below those of boys, 381,000 fewer girls would have been stunted: almost 80,000 more children than the estimate for those who might have foregone stunting had rates of decline not decelerated over 2007–2011.

Figure 17: Fewer stunted children in Bangladesh in 2011 under counterfactuals



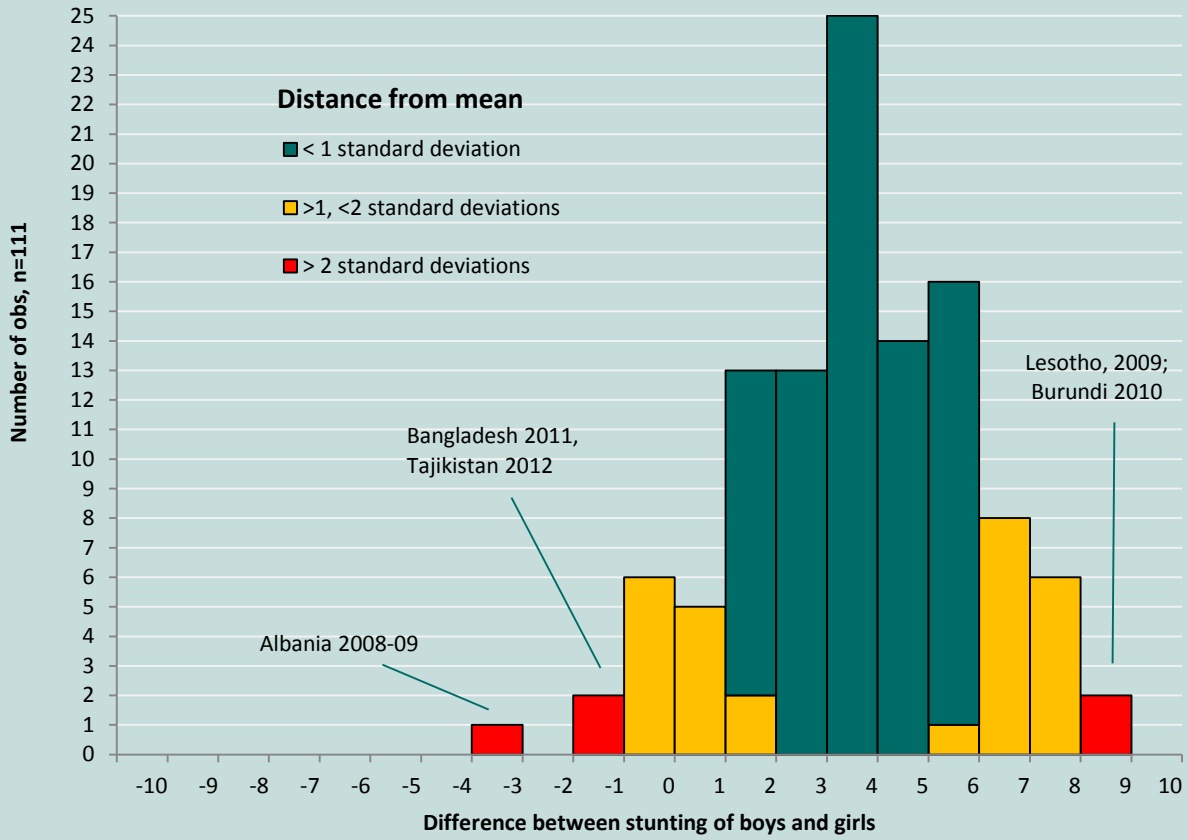
Source: DHS survey data for 2011 from Statcompiler. Population of under-fives from UN Population Division

[6] Sex disaggregated data for the 2012 point are not readily available

Box 4: Differences between boy and girl stunting across 111 surveys

Figure 4.1 plots a distribution of the difference between male and female stunting rates (M-F) across 111 DHS surveys spanning 1999 to 2013. Observations more than two standard deviations from the mean of 3.7 are shaded in red, while those more than one but less than two standard deviations from the mean are shaded yellow.

Figure 4.1 Difference between boys' and girls' under-five stunting, 111 DHS surveys, 1999-2013



Source: Data from DHS Statcompiler for 111 surveys, spanning 1999 to 2013

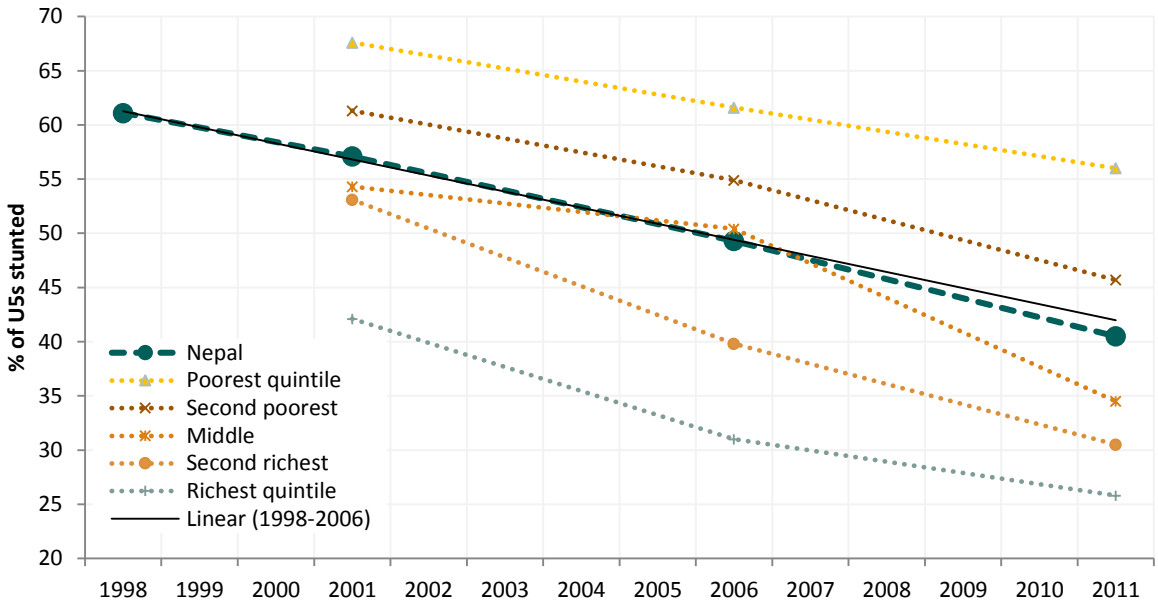
Note: Surveys with values in-between 1 and 2 standard deviations from the mean disadvantaging girls were: Jordan 2002, 2009; Moldova 2005; Nepal 2001; India 2005-06; Cambodia 2000; Armenia 2005; Peru 2011, 2012; Bangladesh 2007; Congo 2011-12; while those disadvantaging boys were: Malawi 2010; Zimbabwe 2010-11, 2005-06; Kenya 2003; Uganda 2011; Tanzania 2010; Peru 2004-06; Nigeria 2003; Haiti 2005-06; Swaziland 2006-07; Rwanda, 2010; Benin 2006; Pakistan 2012-13; Lesotho, 2004; and Zambia, 2007.

2. Nepal

Here, the difference between the counterfactual based on a linear trend and observed outcomes shows rates improved faster than trend since 2006 (Figure 18). The average annual fall in stunting between 1998 and 2006 was 2.7%, while between 2006 and 2011 it increased to 3.9%, so that stunting was 40.5% in 2011 when it might have been 42%. This is a difference of around 15,520 fewer stunted children.

It is thus hard to see any clear impact of higher food prices from 2006 to 2008; although of course one cannot completely rule out an even greater decline in stunting in the absence of food price rises.

Figure 18: Stunting in Nepal and rates of decline, 1998 to 2011



Source: Data from World Bank WDI.

For three surveys in 2001, 2006, and 2011, stunting by income level is also available. This shows broadly consistent improvements by quintile, though between 2006 and 2007 progress in the middle quintile noticably accelerated, even while improvements for the richest quintile decelerated.

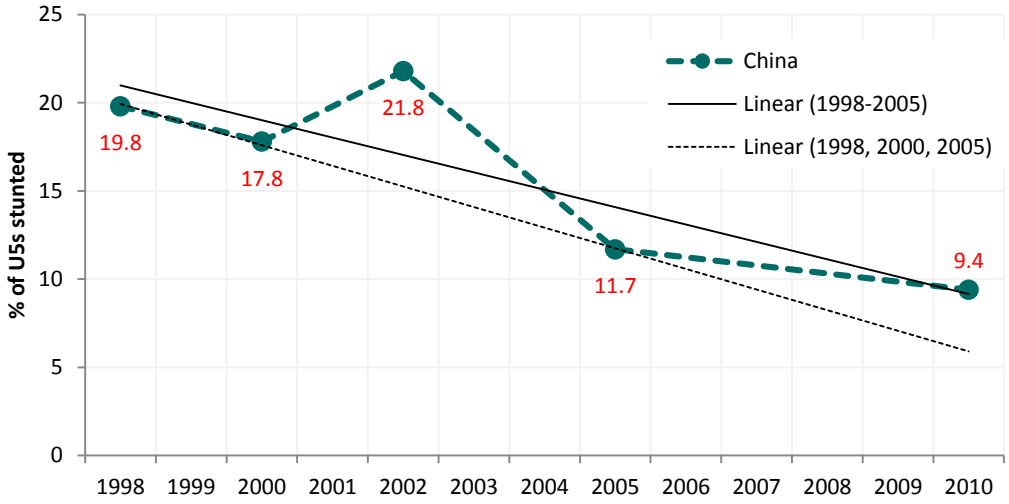
A bias against girls seems also to have shrunk over the period, with the difference between male and female rates of stunting going from between one and two standard deviations from the global mean in 2001 and 2006, to within one standard deviation in 2011, when some 1.9% more boys than girls were stunted. Had the difference between girls and boys rates been the same as it was in 2006 in 2011, some 18,143 more girls might have been stunted than were.

East and Southeast Asia

3. China

In China, where food price rises were muted, stunting declined more slowly from 2005 to 2010 than from 2002 to 2005 (Figure 19): but since stunting apparently spiked in 2002, the 2010 rates were still similar to those expected following a linear trend from 1998 to 2005. Following a trend drawn using only 1998, 2000 and 2005 data, ignoring the spike in 2002, rates in 2010 might have been as low as 6%: see the dotted line in Figure 19. Compared to the 9.4% seen, this is a difference of 2,909,686 under-fives.

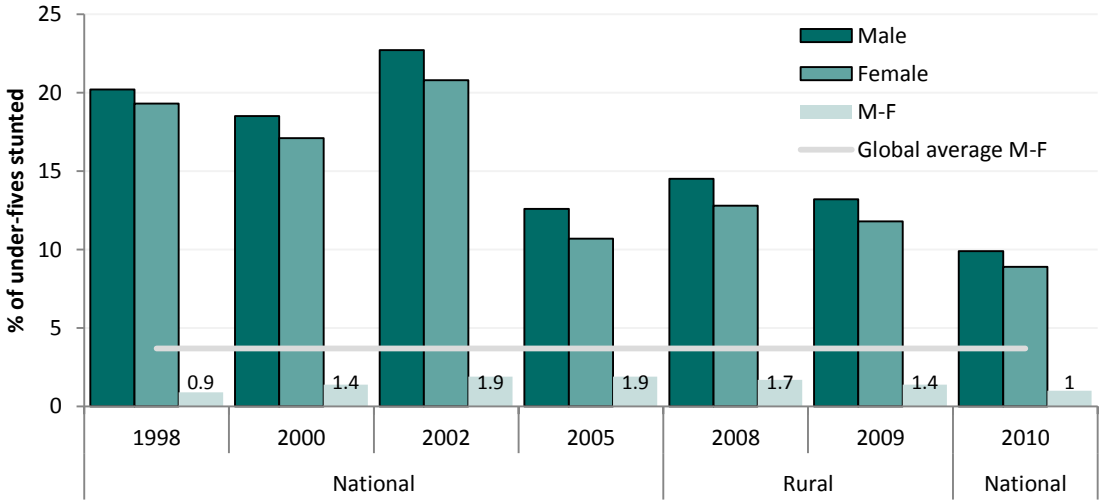
Figure 19: Stunting in China and rates of decline, 1998 to 2010



Source: Data from World Bank WDI. Note: Data for 2008 and 2009 are available from this database but according to the WHO Child Nutrition database this is for rural sites only so it is excluded from this figure.

Disaggregating stunting by sex[7] for the years between 1998 and 2010 for which there are national surveys, male stunting exceeded female stunting by between 0.9 and 1.9% (Figure 20). The difference went from between 1 and 2 standard deviations away from the international mean in 1998 and 2000, to within one standard deviation from the mean in 2002 and 2005, but by 2010 had deteriorated to again appear between 1 and 2 standard deviations from the mean.

Figure 20: Child stunting in China by sex: 1998 to 2010, national and rural



Source: Data from WHO Global Database on Child Grown and Nutrition.
Note: Global average calculated from a sample of 111 Demographic and Health Surveys from Statcompiler

Boys' rates in 2010 were only 1% higher than girls' rates, although had this been 1.9% as in 2005, some 354,196 fewer girls might have been stunted. Had the girls' rate been 3.7% below the boys' rate in 2010 (as the global average), some fewer 1,062,589 girls might have been stunted.

[7] China is not included in the DHS stat compiler database used earlier, however some sex disaggregated statistics are available from WHO Child Growth Nutrition Database

That reality deviates from these counterfactuals may owe little to the 2007/08 food price crisis given limited inflation seen in China's food prices over the period; although an underlying anti-girl bias that appeared to have been shrinking over the 2000s might have increased in 2010. The differences, however may not be statistically significant, given they are not large.

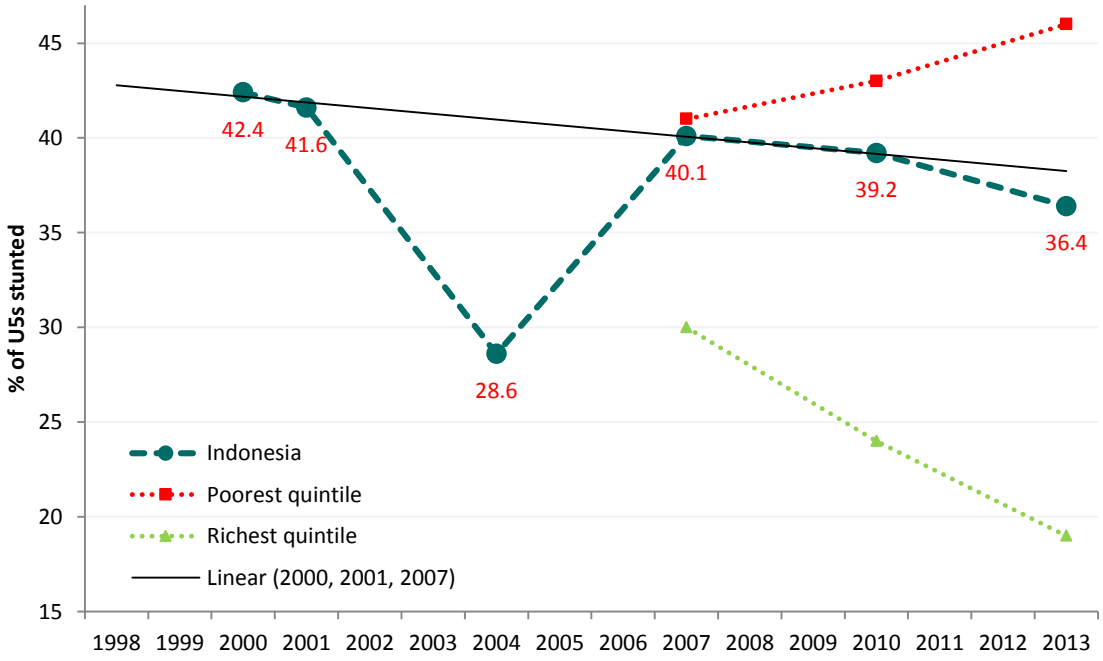
4. Indonesia

Indonesian surveys of child malnutrition include an anomalous result for 2004, suggesting an implausibly dramatic fall in stunting between 2001 and 2004, followed by an equally implausible rise in stunting by 2007 (Figure 21). The 2004 observation, based on a much smaller sample than other surveys,[8] is thus omitted.

Had rates of decline followed a linear trend from 2000 to 2007 excluding the 2004 observation, 38.2% of under-fives might have been stunted in 2013 instead of the 36.4% observed. This equates to some 426,812 fewer cases of child stunting than expected.

Despite this small acceleration in stunting declines over 2010 to 2013, the country's overall progress in tackling stunting is disappointing: other middle income countries have much lower rates of stunting. Given declining numbers of children under five years, falling by 5% between 2010 and 2013, lack of progress is especially surprising.

Figure 21: Stunting in Indonesia and rates of decline, 2000 to 2013



Source: Data from World Bank WDI for national stunting. Stunting for poorest and richest quintiles from Thaha et al., 2015.

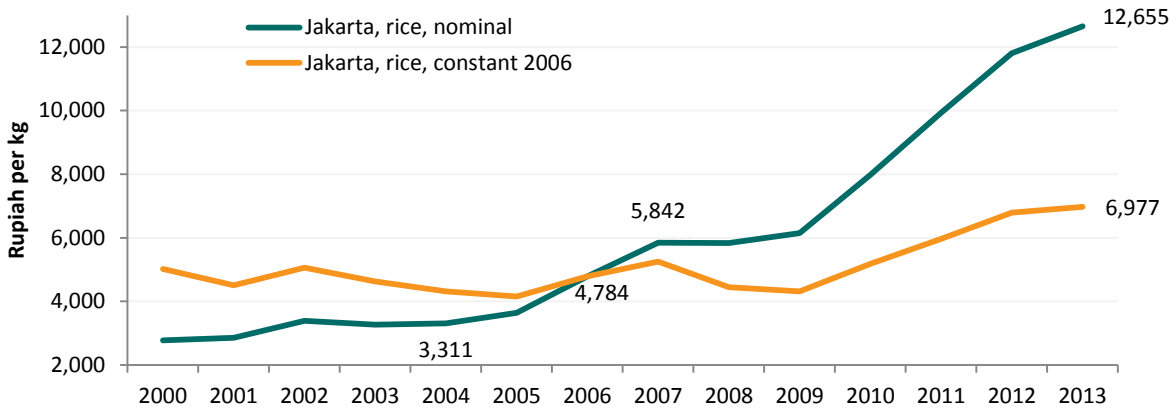
Although overall stunting fell from 2007 to 2013, trends diverged by income group. In the lowest income quintile, stunting rose from 41% in 2007, to 43% in 2010, and 46% by 2013; while it fell in the highest income group, from 30% in 2007 to 24% in 2010 and then 19% by 2013 (Thaha et al., 2015). Thus the national average masks a deterioration for the poorest in society. Although average GDP per capita has been rising in Indonesia, so too has inequality.

Food price rises may thus have contributed to the deteriorations in stunting for Indonesia's poor. Although rice prices only increased 22% between 2006 and 2008, prices were increasing before 2006, and have continued to

[8] The 2004 survey sampled only 3,116 children, compared to 70,591 in 2000, 11,678 in 2001, 77,808 in 2007, 18,768 in 2010, and 75,232 in 2013 (WHO Global Database on Child Growth and Malnutrition).

climb since, see Figure 22. Even deflated, by 2013 the rice price in Jakarta was 46% higher than it was in 2006; in nominal terms it was 165% higher.

Figure 22: Annual average rice price, Jakarta, 2000 - 2006



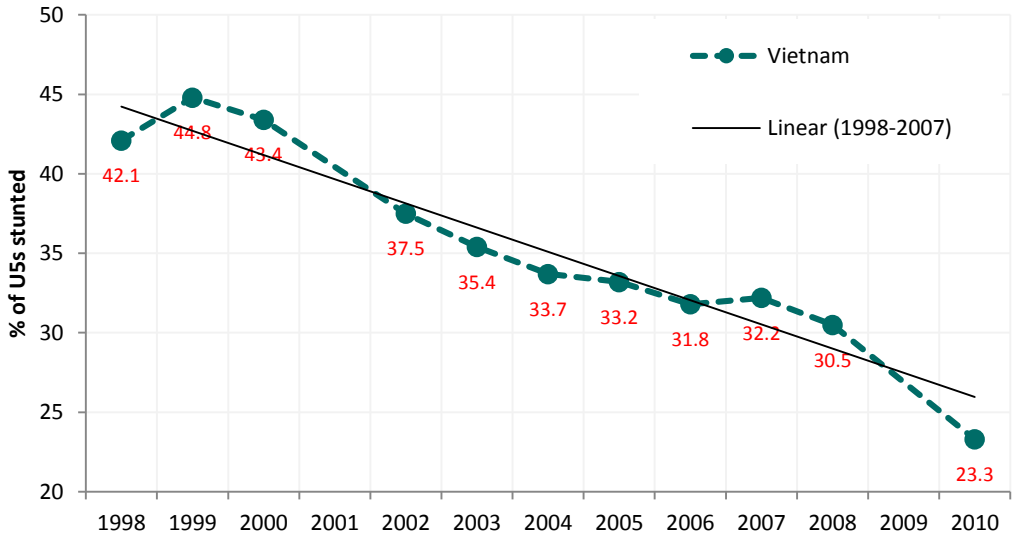
Source: Data from Statistics Indonesia, deflated by Indonesian GDP deflator from World Bank WDI

The difference between boy and girl stunting went from 2.7 percentage points in 2000 to 3.2 in 2001, back down to 2.4 in 2004, 2.5 in 2007, then up to 3.2 in 2010 — quite close to the international mean. In 2013 however the gap had shrunk to 1.7 points. While still within one standard deviation of the global mean, it is quite a shift from the 3.2% point difference seen three years before. Had girls' rates of stunting in 2013 been 3.2% points below boys', some 173,593 fewer girls would have been stunted in 2013.

5. Viet Nam

Vietnam has seen consistent falls in child stunting since 1999 (Figure 23). Though the 2008 observation lies a little above the trend for 1998 to 2007, by 2010 stunting had fallen below trend. Indeed, at the observed rate of 23.3%, instead of 26%, some 195,181 fewer children were stunted in 2010 than might have been following the 10-year trend up to 2007. Nonetheless, deviations from the trend in 2008 are equivalent to around 106,448 more

Figure 23: Stunting in Viet Nam and rates of decline, 1998 to 2010

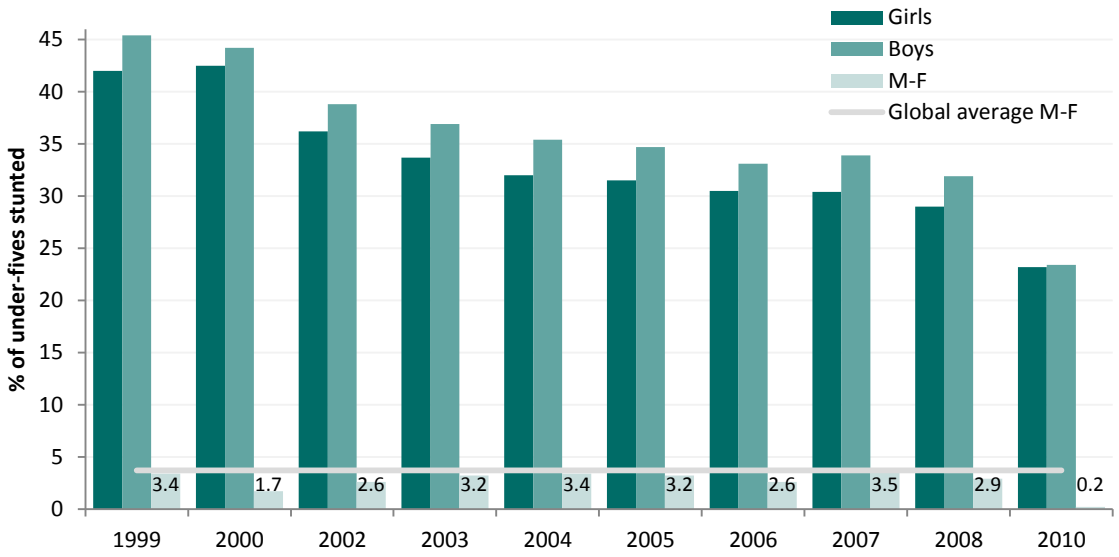


Source: World Bank WDI

Oddly, differences between boys' and girls' stunting for Viet Nam contracted in 2010. While in the nine previous surveys, the difference between male and female rates was within one standard deviation of the global mean, in

2010 it went to between one and two standard deviations (Figure 24). Had female stunting been 2.9% points lower than male rates in 2010 (as in 2008), some 92,912 fewer girls might have been stunted.

Figure 24: Child stunting in Viet Nam by sex: 1999 to 2010, national



Source: Data from World Bank WDI

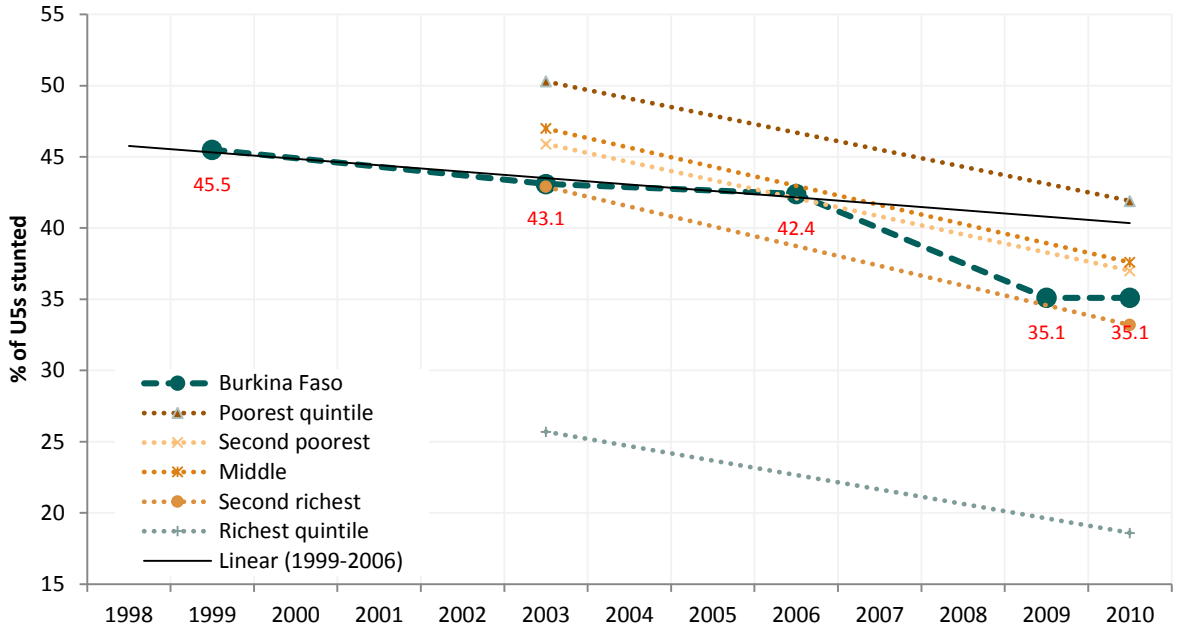
West Africa

6. Burkina Faso

In Burkina Faso, where prices rose moderately in 2008, a previously modest decline in stunting accelerated (Figure 25). Rates fell to 35% in 2009, when had they continued at the same pace as between 1999 and 2006, they might have remained over 40%. This represents about 151,442 fewer under-fives stunted in 2010 than expected (35.1% compared to 40.5%).

Data by income quintile is also available for 2003 and 2010, although unfortunately not for the intervening years. These show relatively consistent improvements by quintile, though perhaps somewhat unexpectedly, slightly higher levels of stunting in the middle quintile compared to the second-poorest.

Figure 25: Stunting in Burkina Faso and rates of decline, 1999 to 2011



Source: Source: World Bank WDI

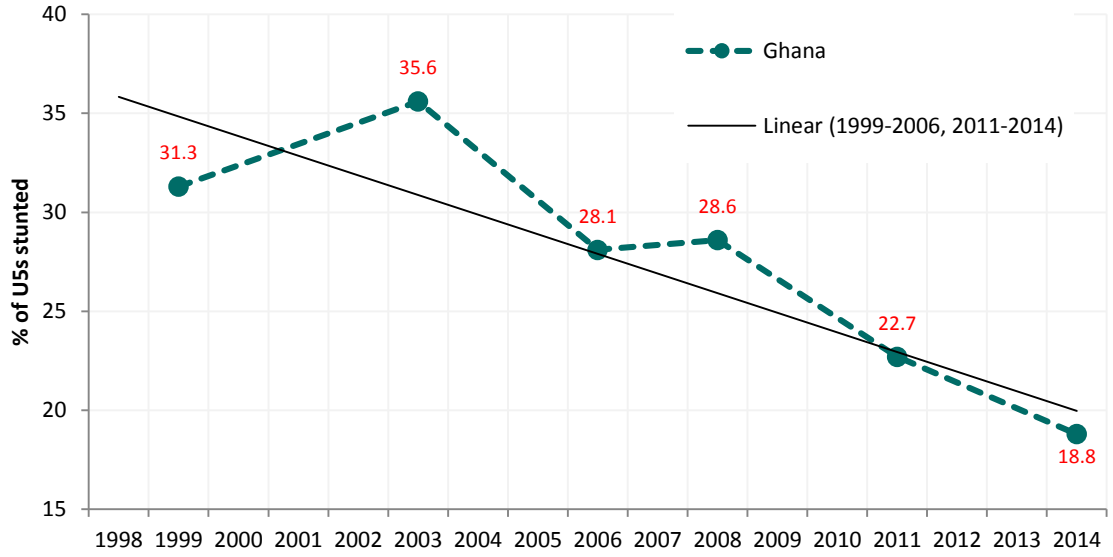
Recent differences between stunting rates of boys and girls in Burkina Faso were 4.4 to 4.5 percentage points, within one standard deviation of the international mean, though with a disadvantage to boys.

7. Ghana

Since 1999 surveys in Ghana show that stunting first rose, then fell, rose slightly, then fell again (Figure 26); making it hard to establish a trend. The counterfactual shown here uses observations from 1999, 2003, 2006, 2011, and 2014; but omitting the observation for 2008 when prices rose. While rates in 2014 were slightly better than this trend might have predicted, a slight deviation from trend is clear in 2008, when stunting was 28.6%, but might have been 26%. This is a difference of some 88,274 children. The slight increase in stunting from 2006 to 2008 probably owes something to food prices.

Nonetheless, Ghana's progress over the last 10 years is impressive; reaching lower rates than seen for Vietnam, and approaching levels seen for Peru. By 2014, stunting had fallen to 18.8%, compared to a predicted 20% by trend: 44,321 fewer children stunted than expected.

Figure 26: Stunting in Ghana and rates of decline, 1999 to 2014

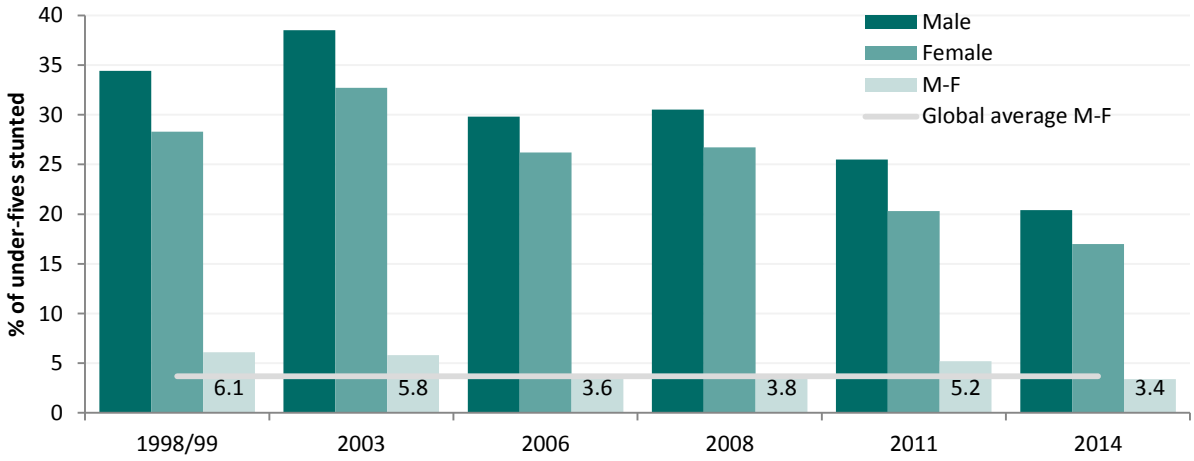


Source: Data from World Bank WDI and DHS for 2014

Declines in fertility rates may have helped. From 1999 to 2013, the adolescent fertility rate fell by almost a third, from 83 per 1,000 to 57 per 1000. At the same time average fertility went from 4.7 births per woman to 3.8 births per woman. Using data from the 2008 survey, Darteh et al. (2014) observed that children were more likely to be stunted if their mothers had them at a younger age, or if there were more children in the household: those in households with 5 to 8 children were 1.3 times more likely to be stunted compared to children in households with 1 to 4 children.

Sex disaggregated stunting rates are shown in Figure 27. The differences between boys' and girls' rates are all within 1 standard deviation from the international mean, except for 1998/99 which is between 1 and 2 standard deviations away, disadvantaging boys[9]. If in 2011, boys' stunting was only 3.6% more than girls' (as in 2006) instead of the 5.2% observed, some 29,174 fewer boys would have been stunted.

Figure 27: Child stunting in Ghana by sex: 1998/99 to 2011, national



Source: Data from WHO Global Database on Child Grown and Nutrition.

[9] Ghana's more matrilineal culture may partially explain this slight disadvantage seen for boys, though most of the differences are small.

8. Niger

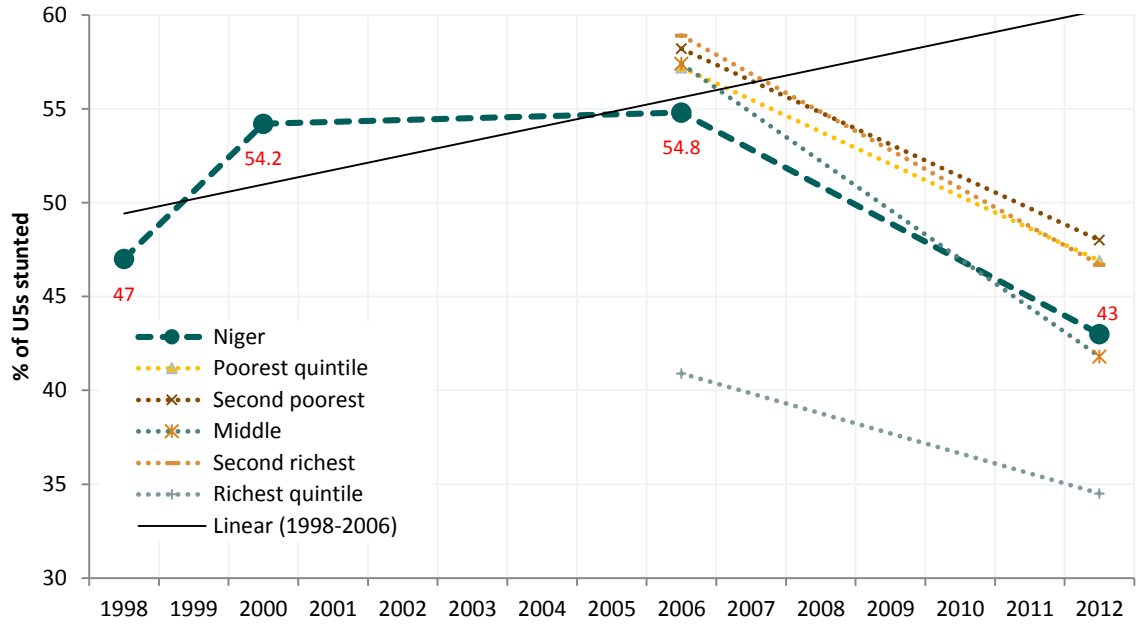
Stunting rose between 1998 and 2000, and changed very little in the six years over 2000 to 2006, despite the 2005 food crisis (Figure 28). After 2006, stunting rates fell by more than 10 percentage points by 2012: this despite another food crisis in 2010.

Following a linear trend between 1998 and 2006 would give a counterfactual of stunting at 60% by 2012, which seems implausible. Instead, imagining stunting improvements had stagnated over the last six years, so that rates were 54% in 2012 instead of 43%, means some fewer 392,190 children were stunted than might have been. Although stunting remains high, the improvement in prevalence is impressive, not only given the crisis in 2010, but also in light of the country's rapidly growing young population. Between 2006 and 2012, the number of under-fives grew by more than 25%, going from around 2.8 million to around 3.6 million.

By income level, stunting improvements over 2006 to 2012 were strongest for the middle quintile; but still fairly impressive across all five groups. Counterintuitively, stunting rates in Niger are not that closely linked to income ranking, with lower rates in the middle compared to the second richest quintile, and in 2012, slightly worse rates in the second-poorest compared to the poorest quintile.

With 3.9% more boys than girls stunted in 2012, and 4% more in 2006, Niger has sex differences close to the global average, comfortably within one standard deviation of the mean.

Figure 28: Stunting in Niger and rate of decline, 1998 to 2012



Source: Data from World Bank WDI.

Niger has seen encouraging progress on other, related indicators. Child mortality fell by 43% between 1998 and 2009, from 226 to 128 deaths per 1000 live births, at an average annual rate of 5.1%: far higher than rates of improvement in neighbouring Benin (2.2%), Burkina Faso (0.8%), Chad (0.9%), Mali (1.8%), and Niger (2.0%) (Amouzou et al., 2012). These improvements may be attributed to:

> *"Government policies supporting universal access, provision of free health care for pregnant women and children, and decentralised nutrition programmes permitted Niger to decrease child mortality at a pace that exceeds that needed to meet the MDG 4."*

...

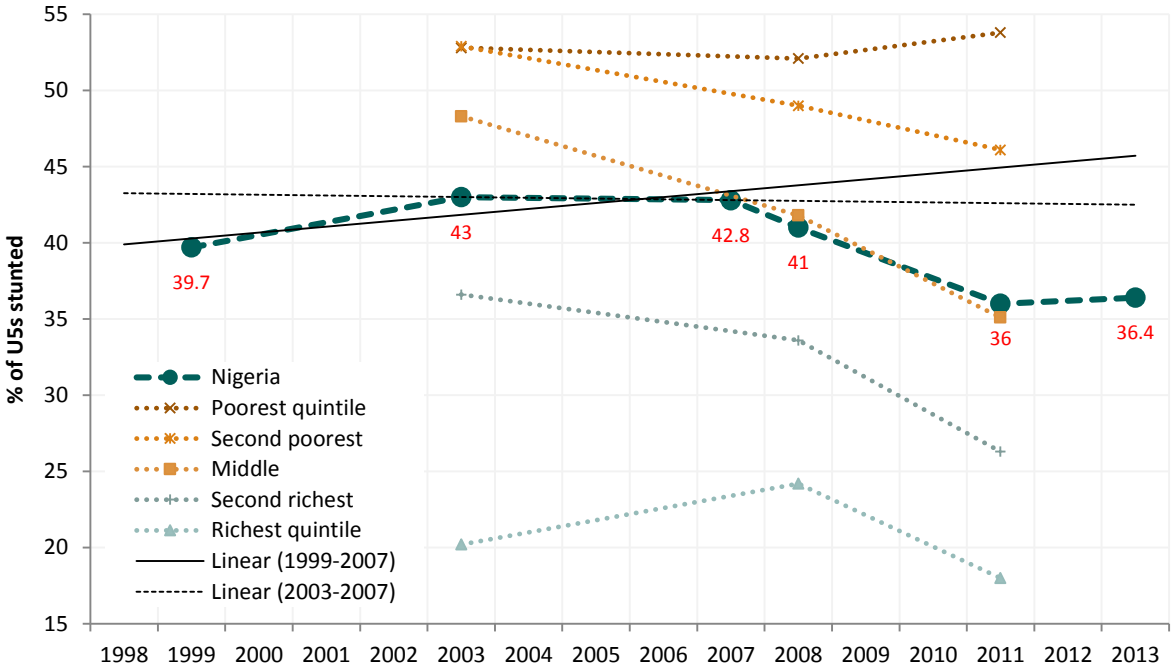
"Niger is an unusual context, and has produced remarkable results for child survival that can set the bar for other countries in the region and worldwide" (Amouzou et al, 2012)

9. Nigeria

Stunting in Nigeria actually increased from 1999 to 2003, declined fractionally to 2007, since when it has fallen (Figure 29). While a linear (and not very plausible) rate of change based on 1999, 2003, and 2007 values would have seen stunting increase to above 45% by 2013, had stunting declined as slowly as between 2003 and 2007, it might have been only around 42.5% by 2013, instead of the 36.4% observed. Compared to this counterfactual, 1,860,424 fewer stunted children were observed: despite the population of under-fives growing rapidly, increasing by 4.7 million over 2007 to 2013, or by around 18%.

For three surveys, data were also available for stunting by income level. In the wealthiest quintile stunting actually rose between 2003 and 2008, while it fell across the others[10] – albeit minutely in the poorest quintile. Between 2008 and 2011 however, stunting rose in the poorest quintile while it fell across all the others. This is similar to what was seen in Indonesia.

Figure 29: Stunting in Nigeria 1999 to 2013



Source: Data from World Bank WDI and DHS statcompiler

Gender differences in stunting also improved over the period, where previously boys were disadvantaged. The difference between boys and girls rates went from between one and two standard deviations from the mean in 2003 (7 percentage points difference), to within 1 standard deviation by 2007, 2008, and 2011 (3.1, 4.6, and 2 points respectively), and fell even closer to the global mean in 2013, a difference of 3.6 percentage points.

Latin America

10. Peru

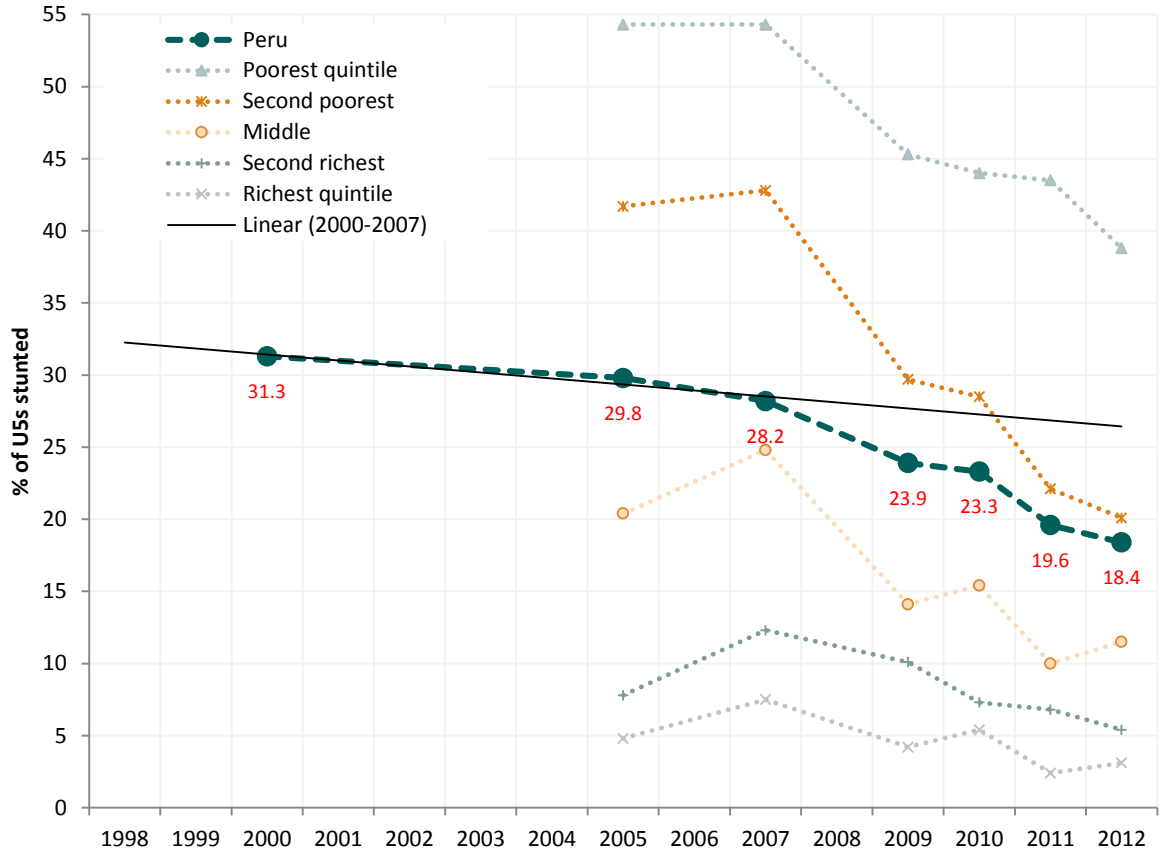
Peru has also seen stunting improvement accelerate over the period of interest, falling dramatically after 2007/2008, see Figure 30. Had stunting followed the trend established between 2000 and 2007, it might have

[10] This rise for the richest quintile is somewhat counterintuitive. If this is in any way a response to global food prices, it may highlight the vulnerability of relatively wealthier urban consumers who relied more on cheap imports compared to others perhaps more insulated from import price fluctuations.

reached only 26.5% in 2012, instead of the 18.4% observed. This equates to some 188,904 fewer under-fives stunted.

By income, since 2005 much of the progress was made among children from the lower three quintiles.

Figure 30: Stunting in Peru 2000 to 2012



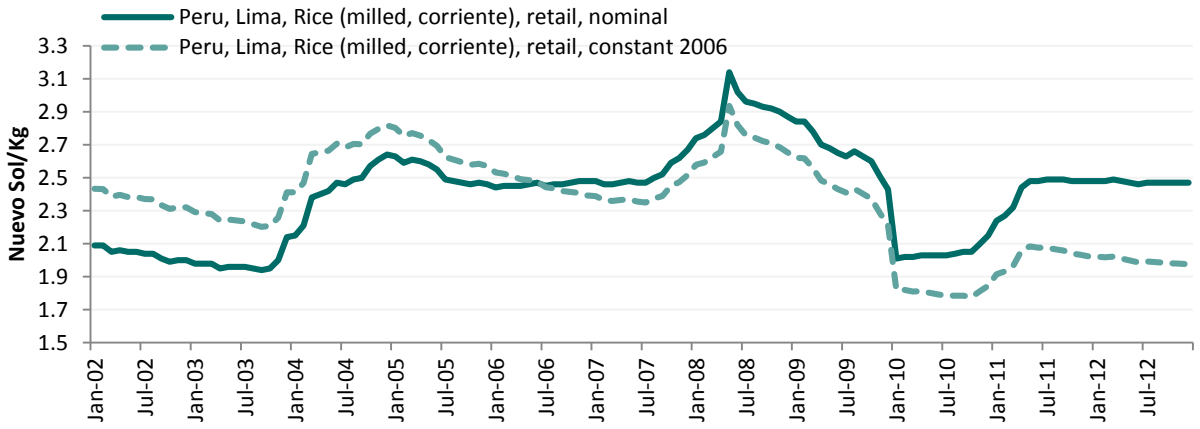
Source: Data from World Bank WDI and DHS statcompiler (2007 data is for 2007/08).

Much of the improvement results from a shift in government nutrition strategy after 2006, according to Acosta and Haddad (2014). This saw the start of the Child Malnutrition Initiative, a civil society platform, adoption of a national poverty reduction strategy with nutrition interventions at its core, and a conditional cash transfer programme, *Juntos*. The government's public commitment to reduce chronic malnutrition in under-fives by 5% in 5 years (5 by 5 by 5) was accompanied by advocacy and monitoring from CSOs. It also helped that the economy was growing rapidly with relatively broadly shared increases in incomes.

Fewer under-fives may have contributed, since the population of under-fives dropped by an estimated 21% between 2007 and 2012.

Food prices too might have helped to positively influence this decline in stunting. Though they rose slightly from 2006 to 2008, by 2012 rice in Lima was almost 20% cheaper than in early 2002 in real terms, and some 33% cheaper than it was in May of 2008, see Figure 31.

Figure 31: Rice prices in Lima, 2002 to 2012, nominal and constant 2006 terms



Source: Data from FAO GIEWS, deflated by the Peru's GDP deflator from the World Bank WDI

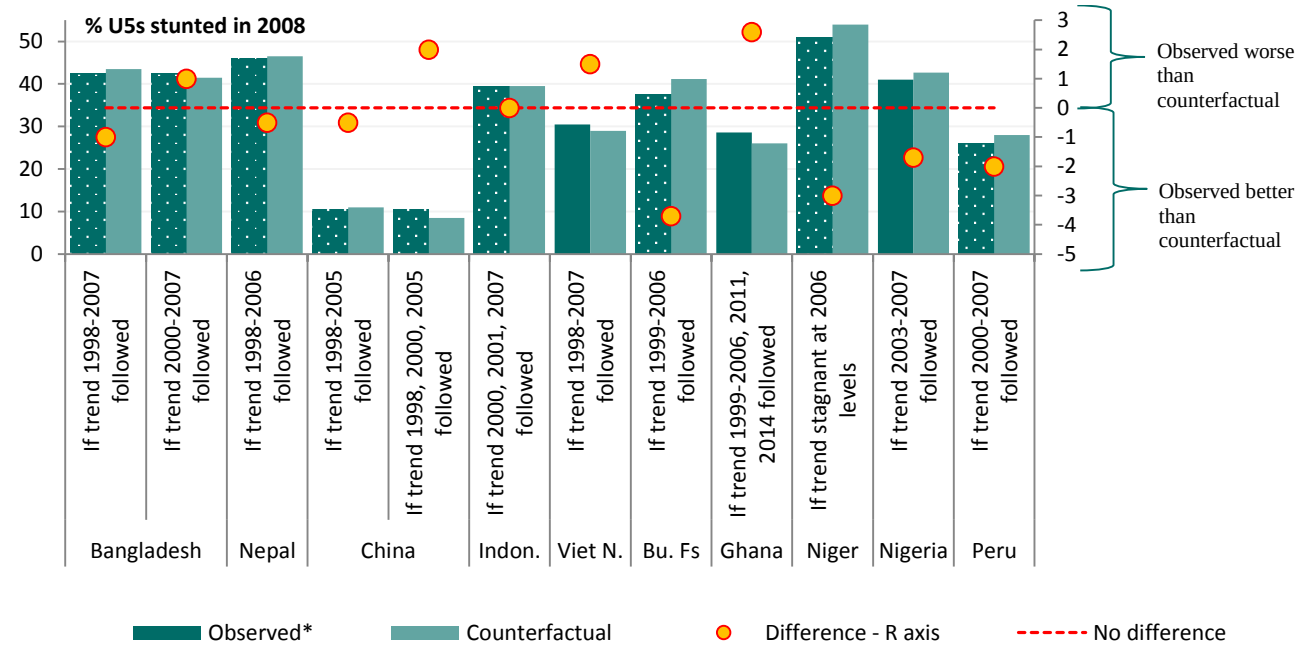
In 2004/06 boys were notably more likely to be stunted than girls, boys' rates being 7 percentage points higher than those of girls, between one and two standard deviations from the international mean. That difference has subsequently fallen: to just 0.8 percentage points in 2012.

3.4 Nutrition impacts compared

Did stunting get worse in 2008?

Of the three countries with a data point in 2008, two showed stunting spikes – Vietnam (by 1.5%) and Ghana (by 2.6%) – while the third, Nigeria, showed a decline from expected levels in 2008 (by 1.7%); see Figure 32. For the other seven countries stunting rates for 2008 can only be interpolated. Those values show a fall in stunting compared to the counterfactual, with only two countries, Bangladesh and China, showing a deterioration — and even then alternative counterfactuals showed the opposite impact.

Figure 32: Child stunting 2008, observed versus counterfactuals, 10 countries



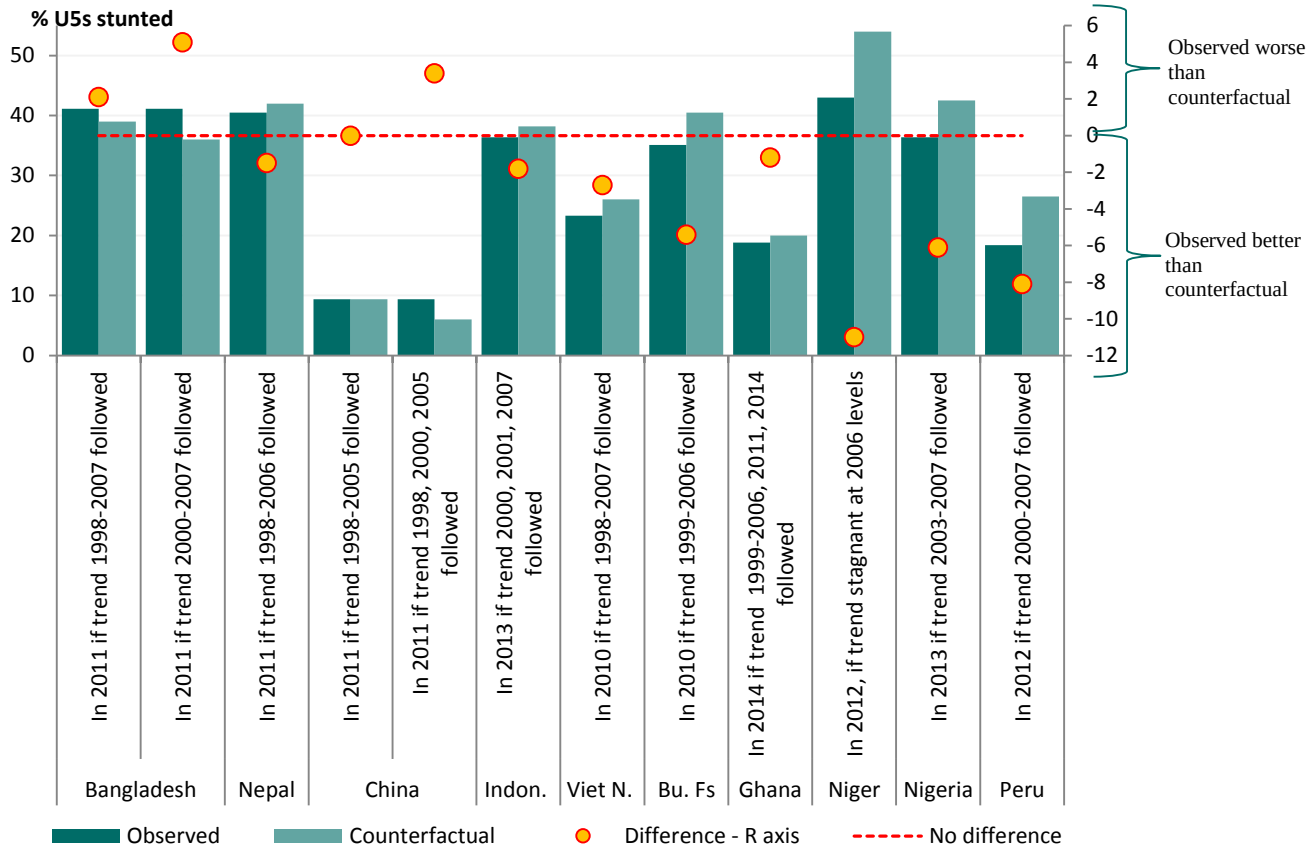
Source: Data from World Bank WDI, DHS, WHO Global Database on Child Grown and Nutrition

*Note: *Where columns are filled with a dotted pattern, 'observed' values are imputed, based on a straight line between two observed values over years straddling 2008.*

What do later surveys indicate about the impact of higher prices?

Stunting which spiked over the crisis subsequently recovered for Ghana and Vietnam (Figure 33). Only in two countries — Bangladesh and China under one counterfactual — was stunting worse than expected following the spike.

Figure 33: Child stunting observations versus counterfactuals, 10 countries, post-2008

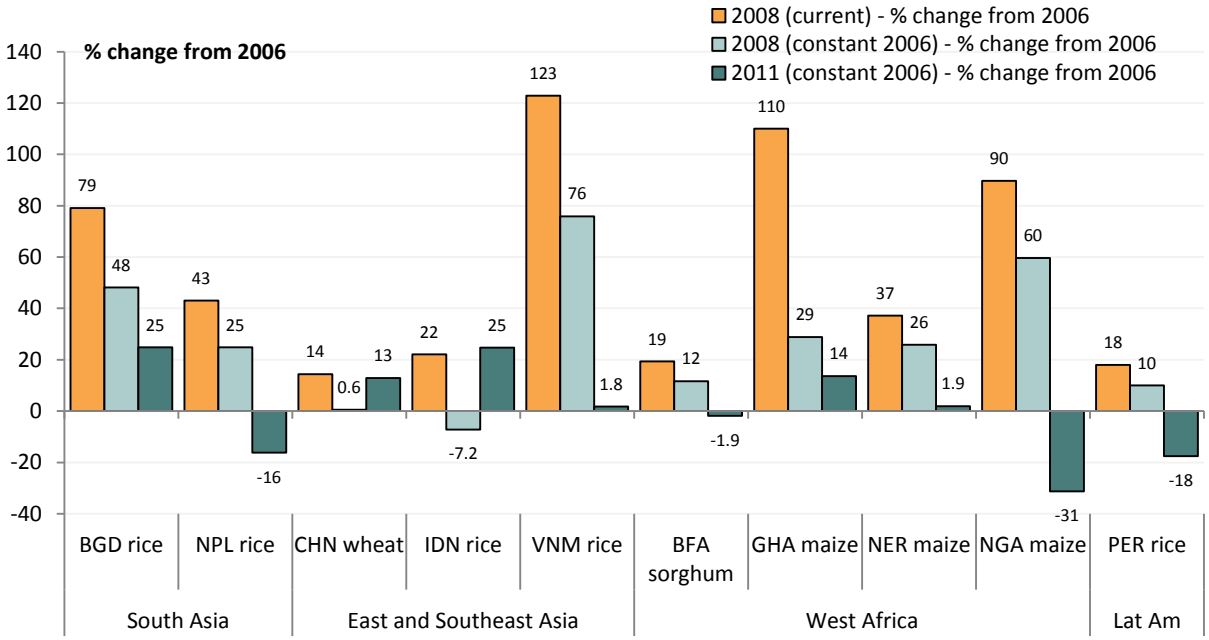


Source: With data from World Bank WDI, DHS, WHO Global Database on Child Grown and Nutrition

Was there any correspondence between changes in stunting in 2008 and later, and the strength of price rises?

Changes in prices of key staples for the ten countries, during the price spike from 2006 to 2008, and after in 2011 appear in Figure 34. The first column shows changes in nominal prices from 2006 to 2008; the second column shows this change after deflating the 2008 price using the GDP deflator; a third column shows deflated prices in 2011 compared to their 2006 levels.

Figure 34: Staple food price changes in 10 countries, 2006 to 2008 and 2011



Source: Data on (monthly) prices from FAO GIEWS, except Indonesia where (annual) prices are from Statistics Indonesia. Prices deflated by US GDP deflators, based to 2006. 3-letter codes correspond with countries: Bangladesh, Burkina Faso, China, Ghana, Indonesia, Nepal, Niger, Nigeria, Peru, and Vietnam.

*Note: Varieties of cereal prices were: **Bangladesh**: Rice, coarse, wholesale, Dhaka; **Burkina Faso**: Sorghum, local, wholesale, Ouagadougou; **China**: Wheat, wholesale, Jiangsu; **Ghana**: Maize, wholesale, Accra; **Indonesia**: Rice, retail, Jakarta **Nepal**: Rice, coarse, retail, Kathmandu; **Niger**: maize, retail, Niamey; **Nigeria**: Maize, wholesale, Kano; **Peru**: rice, milled corriente, retail, Lima; and **Viet Nam**: Rice, 25% broken, export variety.*

Prices increased significantly from 2006 to 2008. In nominal terms, large (80% and over) price increases from 2006 to 2008 were seen for Vietnam[11], Ghana, Nigeria, and Bangladesh. Smaller but significant increases (over 20%) were seen in Nepal, Niger, and Indonesia. In the other countries nominal price increases were less: Burkina Faso, Peru, and China saw increases of between 15% and 19%. In constant terms, price rises were more muted, but only in Indonesia did they fall.

By 2011, however, prices had fallen back from their 2008 levels. In four countries they fell to below their 2006 levels, barely changed at all in two cases, and in the other four countries prices had fallen back but were still up by 13% to 25% on their 2006 levels.

How did these price changes compare to differences between observed stunting and counterfactuals? In 2008 (Table 2, left panel), countries where stunting rose in 2008 — Ghana and Vietnam — saw moderate to high price rises from 2006 to 2008. In contrast, Nigeria also saw high price increases, yet stunting still declined.

Table 2: Observed stunting, counterfactuals, and food price changes: 2008 and beyond

	Observed stunting 2008 [interpolated stat in italics]	Counterfactual 2008	Difference: Obs-Counterfactual	Food price change (%) 2006 to 2008, constant 2006	Later year	Observed	Counterfactual	Difference: Obs - Counterfactual	Food price change (%) 2006 to 2011, constant 2006
Bangladesh	*42.5*	43.5	-1	48	**2011**	41.4	39	2.4	25
	42.5	41.5	1		**2011**	41.4	36	5.4	

[11] For Vietnam prices quoted are for their *export* rice, which may have risen more than prices on domestic markets. Comparing Thai export to local prices (Figure A6, Annex A) suggests that such differences may be minor.

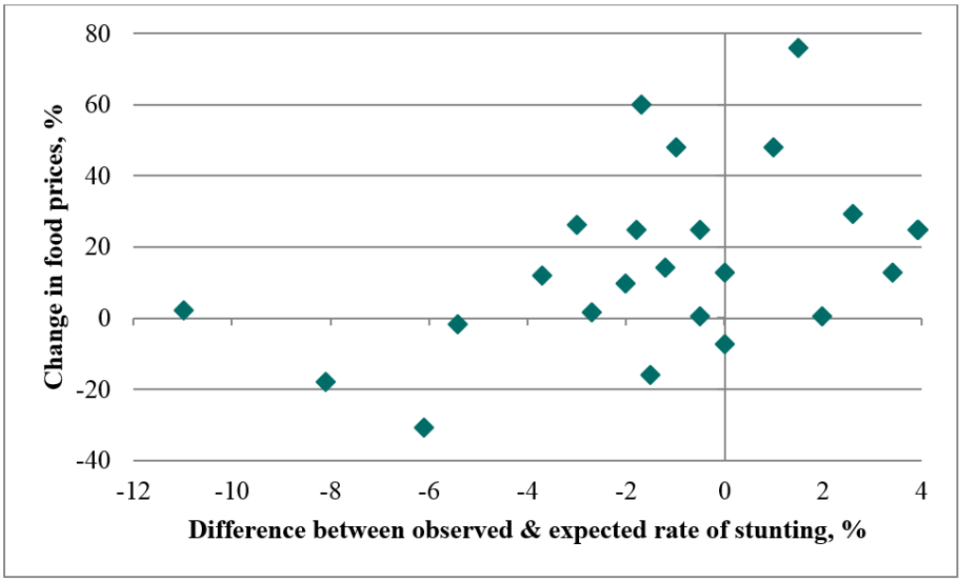
						2013	38.7	37	1.7	
						2013	38.7	32.5	6.2	
Nepal	*46*	46.5	-0.5	25		**2011**	40.5	42	-1.5	-16
China	*10.5*	11	-0.5	0.6		**2010**	9.4	9.4	0	13
	10.5	8.5	2			**2010**	9.4	6	3.4	
Indonesia	*39.5*	39.5	0	-7.2		**2013**	36.4	38.2	-1.8	25
Vietnam	30.5	29	1.5	76		**2010**	23.3	26	-2.7	1.8
Burkina Faso	*37.5*	41.2	-3.7	12		**2010**	35.1	40.5	-5.4	-1.9
Ghana	28.6	26	2.6	29		**2014**	18.8	20	-1.2	14
Niger	*51*	54	-3	26		**2012**	43	54	-11	1.9
Nigeria	41	42.7	-1.7	60		**2013**	36.4	42.5	-6.1	-31
Peru	*26*	28	-2	10		**2012**	18.4	26.5	-8.1	-18

Source: With data from World Bank, WHO, and DHS on stunting, food prices from FAO GIEWS and Statistics Indonesia

Note: Where 'observed' values for 2008 are imputed using observed values straddling 2008, entries are in italics. Where more than one line appears for a country, more than one counterfactual is presented. See note to Figure 16 for the staple prices referred to in the right-hand column.

After 2008, it seems that better than expected stunting figures are somewhat associated with lower food prices. Combining all the data in Table 2 and plotting in a scatter graph (Figure 35) shows considerable correspondence between the price rises and more-than-expected stunting. The correlation coefficient is 0.45. A linear trend between prices and stunting suggests that stunting was only higher than expected when prices were up by 20% or more. Even then in five cases, price increases of more than 20% did not result in stunting being worse than expected.

Figure 35: Changes in food prices and differences between observed and expected rates of stunting, 10 countries, 2006 to 2014



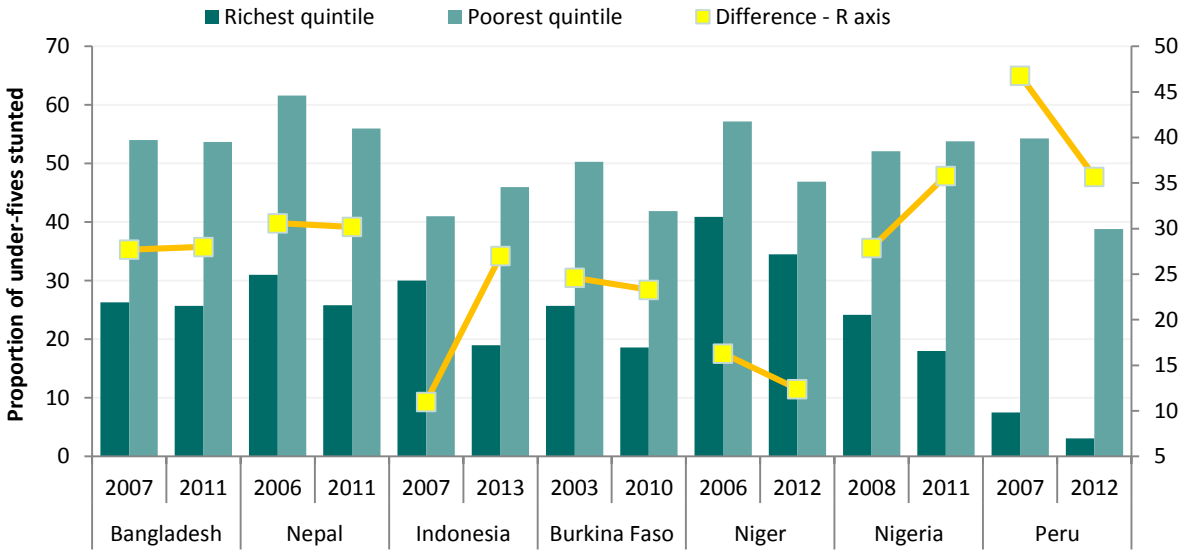
Source: From data pairs in Table 2. For Bangladesh, averages taken for the two estimates of stunting differences for 2011 and 2013.

Were impacts of higher prices on malnutrition more pronounced among children of those on low incomes?

In some cases while stunting fell for children in households in richer quintiles, stunting stagnated or deteriorated for poorer quintiles. National averages showing overall improvements can mask considerable hardships for the poorest quintiles, as well as widening inequalities, as in the cases of Indonesia and Nigeria: see Figure 36.

On the other hand, the gap in stunting across poorest and richest quintiles shrank notably in Peru and Niger, and slightly in Burkina Faso. Almost no changes were seen in Bangladesh and Nepal.

Figure 36: Changes in stunting prevalence by quintile for 7 countries



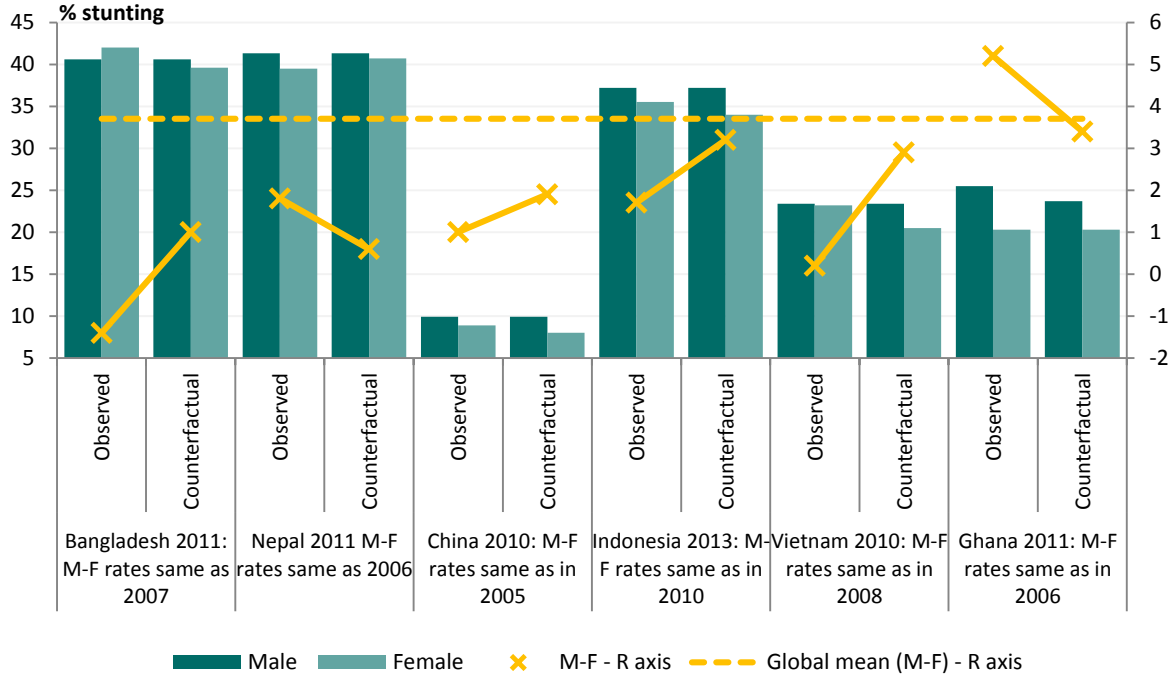
Source: Data from DHS statcompiler and Thaha et al., 2015. Stunting data by quintile for more than one year was not readily available for China, Ghana, or Viet Nam.

Did the impacts of the price spike differ for boys and girls?

In some cases, differences between male and female stunting rates changed over the crisis: in most of these cases to the disadvantage of girls, seemingly pointing to sex bias in crisis impacts. In five countries out of seven, counterfactuals girls stunting was worse than expected, and more so for girls than for boys (Figure 37).

Plausible explanations are that with higher food prices girls may have been fed fewer complementary foods, or received less medical attention than boys.

Figure 37: Stunting of boys and girls in selected cases: observed and counterfactuals



Source: With data from World Bank WDI, DHS, WHO Global Database on Child Grown and Nutrition

3.5 Discussion

To summarise the key points from this analysis:

- The few field studies using primary observations often find that higher food prices lead to less access to food and worse child nutrition;
- Child stunting in most developing countries was usually lower after the price spike of 2007/08 than before the spike, according to national surveys;
- That does not necessarily mean that higher prices had no effect on child malnutrition: stunting might have fallen even more had prices not risen;
- So, by examining trends in stunting before the spike, counterfactual analyses were constructed for ten countries. Only in four did it seem that stunting in 2008 was higher than the trend would have predicted. Even then, in two of the four countries, stunting levels fell back a few years later to below the previous trend;
- In many countries it seems girls' nutrition suffered more in increased stunting or slower declines in stunting than boys' during the price spike;
- In some countries, with Indonesia the prime example, the children of households on low incomes suffered more than those from higher income households; and,
- The greater the rise in domestic food prices from 2006 to 2008, and from 2006 to 2011, the more declines in stunting were slowed or reversed. The correlation between prices and stunting, however, is modest: other factors are at least as important in affecting stunting.

Overall, it seems that higher domestic food prices at the time of the 2007/08 spike in cereals prices on world markets does not seem to have resulted in more children stunted than expected in most countries. Even when higher prices did harm child malnutrition, it seems that within a few years stunting rates fell back to expected trends.

A striking additional finding from the counterfactual analyses is that in Burkina Faso, Ghana, Niger, Nigeria and Peru reductions in stunting have accelerated since the mid-2000s. These improvements most probably stem from better health services, specific nutrition programmes, and better sanitation that have outweighed any possible deterioration in food access from higher prices. Niger's stunting rates fell considerably even through the 2010 food crisis.

These findings need some qualification since neither data availability nor depth of analysis are optimal. Few developing countries carry out national surveys of child nutrition more than once every five years. That prevents observations of changes that may apply over shorter periods, as may be expected with food price spikes. Some countries have even less regular surveys so that trends cannot be reliably established.

This analysis has not probed age cohorts among children aged less than five. Hence in cases such a Viet Nam where stunting rose above the trend in 2008 but then later fell back to below the trend, the 'recovery' of stunting could be simply a cohort effect, rather than children recuperating. Some of the increased numbers of children stunted in 2008 would not be measured again in subsequent surveys, since the affected cohorts would have reached five years. By 2013, all children observed in 2008 will have aged beyond the sample age group. A more detailed analysis would look to track specific age cohorts from before the spike, through it, and after. Very few developing countries, however, have the frequency of surveys to make this possible — Peru may be the only one.

The analysis of effects broken down by sex of child and income of household has been exploratory. If children from poor households were hit harder by higher prices, and if girls suffered more than boys, then nutritional harm — at very least proportionately among more vulnerable children — could be greater than aggregated national statistics show. Other studies indicate as much. For example, a regression across 50 countries of economic shocks on infant mortality found girls significantly more sensitive to economic shocks than boys, particularly to large negative shocks (Baird et al., 2009).[12]

Finally, what may be the ***policy lessons*** from these findings?

Higher food prices are likely, all other things being equal, to lead to less food access and hence worsened nutrition for children. Effects should be more severe for children in low-income households. Hence when food prices rise sharply, social protection for vulnerable groups is indicated. That is usually only possible when some form of social protection is already in place that can be enhanced or scaled out during price spikes. For example, the value of a cash transfer could be increased or a public employment programme expanded.

Policy responses might also be tailored to protect girls in crises. Where social protection exists, transfers could be increased for families with girls. Health professionals could also be required to monitor growth of girls more closely as part of routine health checks. How appropriate these policies might be depends somewhat on what causes girls' disadvantage in the first place.

All other things, however, are not equal. Child nutrition might be protected during food price spikes by economic growth with rising wages; or by public programmes to improve child care and health that might offset any reduction in access to food. Hence the threat of higher prices is another reason to prioritise investments in broad-based growth and people's health — that would pay off in any case.

More frequent surveys of child nutrition would help policy-makers to identify problems and vulnerable children, to increase the precision of policy response.

[12] Their findings per region were: For a 1% fall in GDP:

	Boys mortality increase per 1000	Girls mortality increase per 1000
SSA	0.33	0.62
LAC	0.29	0.46
SE Asia	0.15	0.24
S Asia	0.72	1.43
MENA	0.18	0.78

Source: Baird et al., 2009

References

Acosta, A.M., and L. Haddad, 2014. The politics of success in the fight against malnutrition in Peru. Food Policy 44, 26-35

Akhter, N., 2013. Food and nutrition security in the rural plains of Nepal: impact of the global food price crisis PhD Thesis, University College London (University of London)

Amouzou A., O. Habi, K. Bensaïd, adn the Niger Countdown Case Study Working Group, 2012. Reduction in child mortality in Niger: a Countdown to 2015 country case study. The Lancet 380: 1169-78

Baird, S., J. Friedman, and N. Schady, 2009. Aggregate Income Shocks and Infant Mortality in the Developing world. Working Paper. World Bank http://siteresources.worldbank.org/INTAFRICA/Resources/BairdFriedmanSchady_072109.pdf

Compton, J., S. Wiggins, and S. Keats, 2010. Impact of the global food crisis on the poor: what is the evidence. ODI Report. http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/6371.pdf

Darteh, E. K. M., E. Acquah, and A Kumi-Kyereme. 2014. Correlates of stunting among children in Ghana. BMC Public Health 14 504

Dawe, D., C. Morales-Opazo, J. Balie, and G. Pierre, 2015. How much have domestic food prices increased in the new era of higher food prices? Global Food Security 5, 1-10

de Brauw, A., 2011. Migration and child development during the food price crisis in El Salvador. Food Policy 36 (1): 28-40

Headey, D., J. Hoddinott, D.Ali, R. Tesfaye, and M. Dereje, 2015. The Other Asian Enigma: Explaining the Rapid Reduction of Undernutrition in Bangladesh. World Development, 66, 749-761

Heltberg, R., N. Hossain, A. Reva, and C. Turk, Jan 2012. A**natomy of Coping: Evidence from People Living through the crises of 2008-11**. Policy Research Working Paper. The World Bank.

Hossain, N. 2009. Accounts of Crisis: Poor People's Experiences of the Food, Fuel and Financial Crises in Five Countries. Report on a pilot study in Bangladesh, Indonesia, Jamaica, Kenya and Zambia, January-March 2009. Institute of Development Studies.

Hossain, N., and D. Green, July 2011. Living on a Spike: How is the 2011 food price crisis affecting poor people? Oxfam Policy and Practice: Agriculture, Food and Land, 11 (5) pp. 9-56

Martin-Prevel, Y., E. Becquey, S. Tapsoba, F. Castan, D. Coulibaly, S. Fortin, M. Zoungrana, M. Lange, F. Delpeuch, and M. Savy, 2012. The 2008 Food Price Crisis Negatively Affected Household Food Security and Dietary Diversity in Urban Burkina Faso. The Journal of Nutrition 142 (9) 1748-1755

Mason, N.M., T.S. Jayne, A. Chapoto, and C. Donovan, 2011. Putting the 2007/08 global food crisis in longer-term perspective: Trends in staple food affordability in urban Zambia and Kenya. Food Policy 36 (3): 350-367

Matin, I., M. Parveen, N.C. Das, N. Mascie-Taylor, and S. Raihan, May 2009. Implications for Human Development - Impacts of Food Price Volatility on Nutrition and Schooling. BIDS Policy Brief.

McNair, D., 2012. High and volatile food prices are the new normal: we must act now. The Guardian, Poverty Matters Blog http://www.theguardian.com/global-development/poverty-matters/2012/oct/10/high-volatile-food-prices-normal

Minot, N., 2013. How Volatile Are African Food Prices? IFPRI Research Brief 19. http://www.ifpri.org/sites/default/files/publications/RB19.pdf

Outes, I., C. Porter, A. Sanchez, and J. Escobal, Nov 2012. Food price shocks, early nutrition and cognitive development: evidence from Peruvian sibling pairs. Draft http://www.hw.ac.uk/schools/management-languages/documents/newsevents/Peru_food_price_PORTER.pdf

Thaha, A.R., C. Siagian, M. Surjadjaja, and E. Ruswiyani, 2015. Stunting Phenomenon in Indonesia: Who and Why. Article Hasanuddin University. http://222.124.222.229/handle/123456789/13841

Vellakkal, S., J Fledderjohann, S. Ebrahim, and D. Stuckler, 2014. Food price shock and child nutrition: a multi-level, quasi-natural experimental analysis in Andhra Pradesh, India. Journal of Epidemiology and Community Health 68: A63

Wiggins, S., and S. Keats, April 2013. **Food prices annual review: Year ending April 2013.** ODI Report. http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8475.pdf

Wiggins, S., and S. Keats, Aug 2013. **The end of cheap rice: A cause for celebration?** Report. ODI. http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8516.pdf

Wiggins, S., and S. Keats, March 2013. **Looking back, peering forward: Food prices & the food price spike of 2007/08**. ODI report. http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8339.pdf

Wiggins, S., and S. Keats, March 2015. **The surprising fall in oil prices since mid-2014. What does it mean for food and agriculture?** ODI Report. http://www.odi.org/publications/8890-surprising-fall-oil-prices-since-mid-2014-does-mean-food-agriculture

Wiggins, S., and S. Keats, October 2014. **Rural wages in Asia**. ODI Report. http://www.odi.org/publications/8747-rural-wages-asia

Wiggins, S., and S. Keats. May 2014. **Food Prices 2013/14: Annual Review**. ODI Report. http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8976.pdf

Annex A: Domestic prices

FAO GIEWS – an established source for Food price data

Since the global food price spike of 2007/08 (GFPS hereafter), food price data of the type usually collected by national statistical agencies [for instance for the purpose of computing Consumer Price Indices (CPIs)] is more readily available for a significant sample of countries, thanks to the efforts of FAO's Global Information and Early Warnings System (GIEWS). In the wake of the global food price crisis, GIEWS launched a Food Price Monitoring and Analysis Tool (online here: http://www.fao.org/giews/pricetool/) to collate prices (mostly of key staple crops – but also in some cases for a number of other food products) from a variety of sources in order to make them readily available – in local currencies and converted to US$ terms. While the database does not yet cover all countries and contains varying detail in terms of market and food disaggregation across those it does include, it is a vast step up from the type of food price information readily available going into the GFPS, representing a potentially very valuable tool. This database for instance informs FAO food price monitoring bulletins such as those available here: http://www.fao.org/giewS/english/gfpm/index.htm , as well as the 'Food

Price Watch' bulletins of the World Bank – see a recent one here: http://www.worldbank.org/content/dam/Worldbank/document/Poverty%20documents/pov-FPW_Sept%202014_final-web.pdf

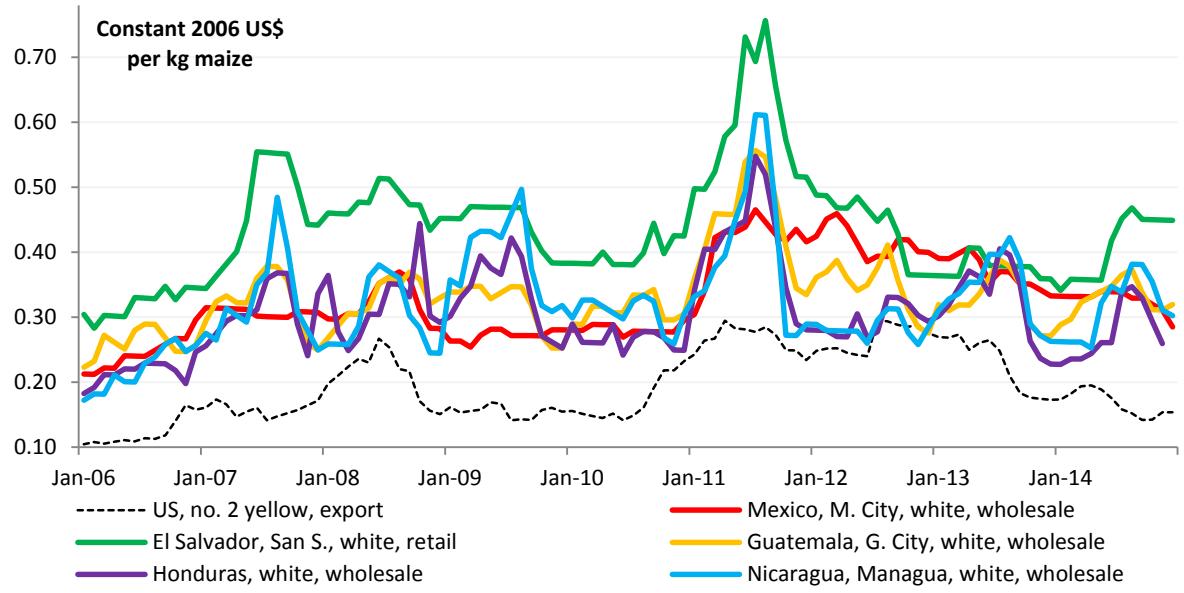
With the benefit of hindsight and the expanded GIEWS database then, what happened to prices of key staples across the world over the 2007/08 period – and what paths have they taken since things calmed down?

Maize

Following the 2007/08 GFPS, US (yellow export) maize prices price began another fairly sharp rise in the latter part of 2010, owing largely to poorer than expected harvests in the northern hemisphere and prevailing low stocks (also likely jitters a few years after the most significant spike in food grain prices seen in more than 30 years). Prices then fell a little following good harvests in 2011, only to rise again on the back of a 100-year drought in the US Midwest in 2012. Since then, relatively plentiful maize harvests have helped prices to decline again.

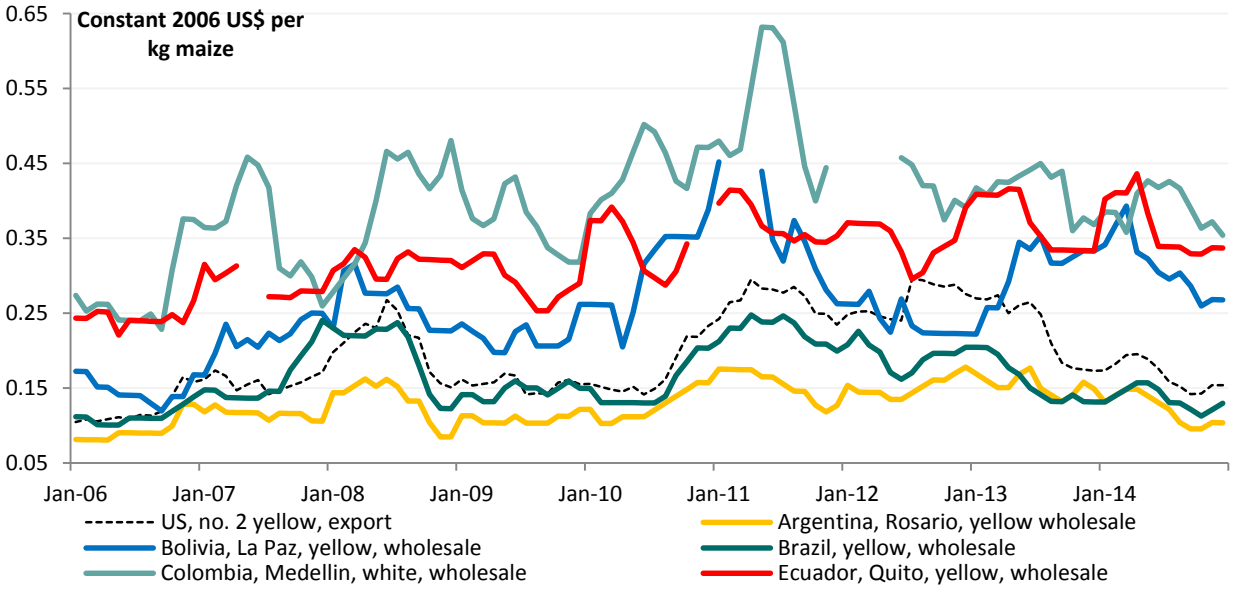
So how have these broad changes been reflected in different regions of the globe? In Mexico and Central America, while price spikes were observed in most cases around the same time as the US maize price rises in 2008, far more dramatic spikes were observed for most places in 2011 – see Figure A1. In South America, Brazilian and Argentinian prices followed very similar trajectories to the US maize price, while in Ecuador, Colombia, and Bolivia, prices seemed more determined by domestic than international factors – see Figure A2.

Figure A1: Maize prices in Mexico and Central America from January 2006 to Dec 2014



Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

Figure A2: Maize prices in South America from January 2006 to Dec 2014

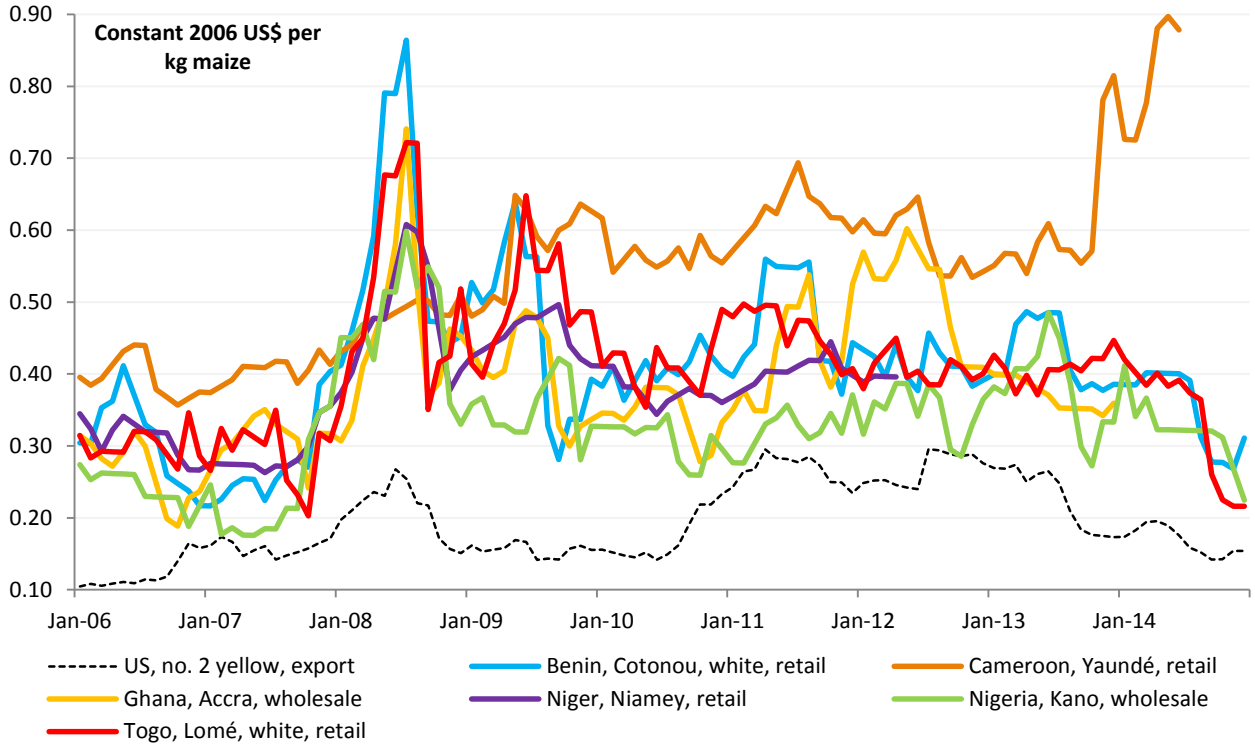


Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

In West Africa, unlike the situation in Central America, the spike over the 2007/08 period was more obvious than any subsequent spikes. Most prices move broadly in step across this region, though Cameroon's latest rise is an exception – See Figure A3.

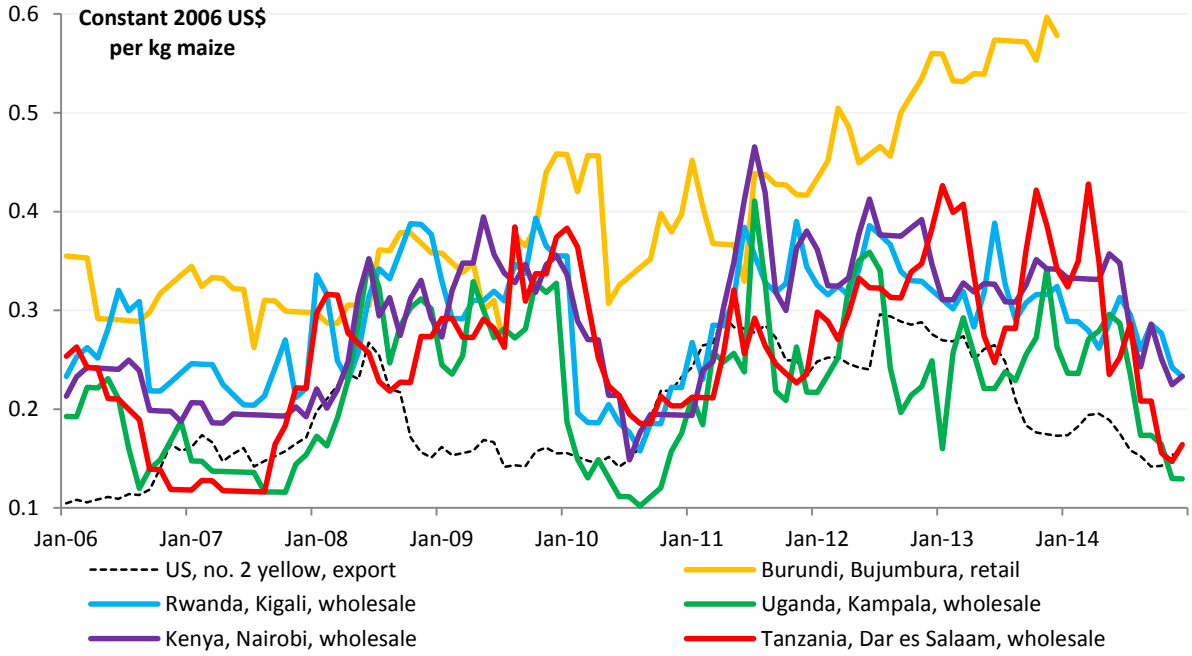
In the East African Community countries, maize prices followed very similar paths across Rwanda, Kenya, Uganda, and Tanzania – but diverged, particularly towards the later half of the time period, for Burundi. In each case, price rises over the GFPS period were sustained for far longer than they were in the US case – only dropping substantially in most cases in mid-2010, before spiking again in 2011 – see figure A4.

Figure A3: Maize prices in West Africa from January 2006 to Dec 2014



Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

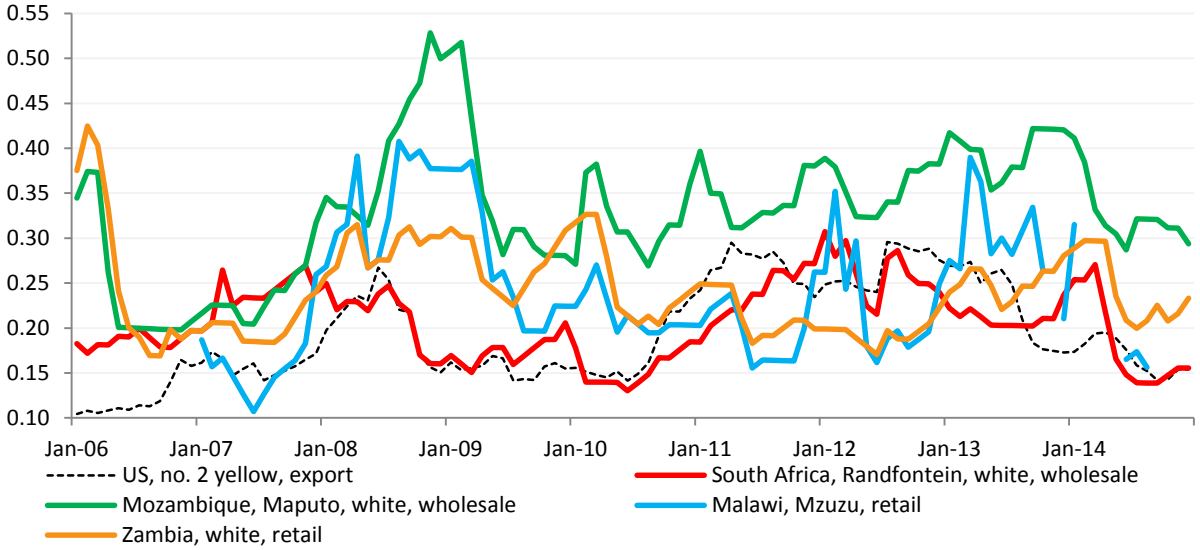
Figure A4: Maize prices in East African Community countries, January 2006 to Dec 2014



Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

Finally, maize prices across a selection of Southern African countries are shown in Figure A5. Of all the countries with maize prices profiled here, seasonality in prices is most apparent for the case of Mozambique—with regular peaks associated with 'hunger seasons'.

Figure A5: Maize prices in Southern African countries, January 2006 to Dec 2014

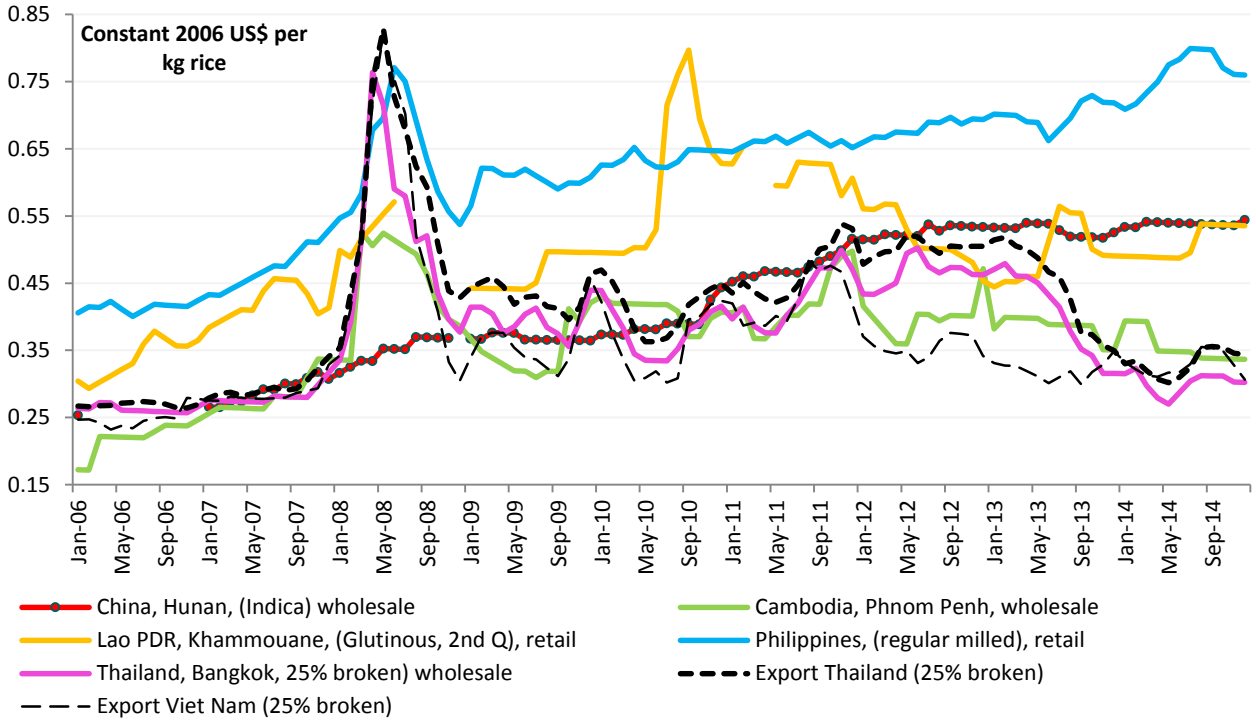


Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

Rice

In East and Southeast Asia, most countries saw spikes – China being an exception. Interestingly though, price rises have been moderate but quite sustained for rice in China since then (see Wiggins and Keats, Aug 2013 for more details). These sustained price rises also appear for the Philippines, where prices did spike over the GFPS – see Figure A6.

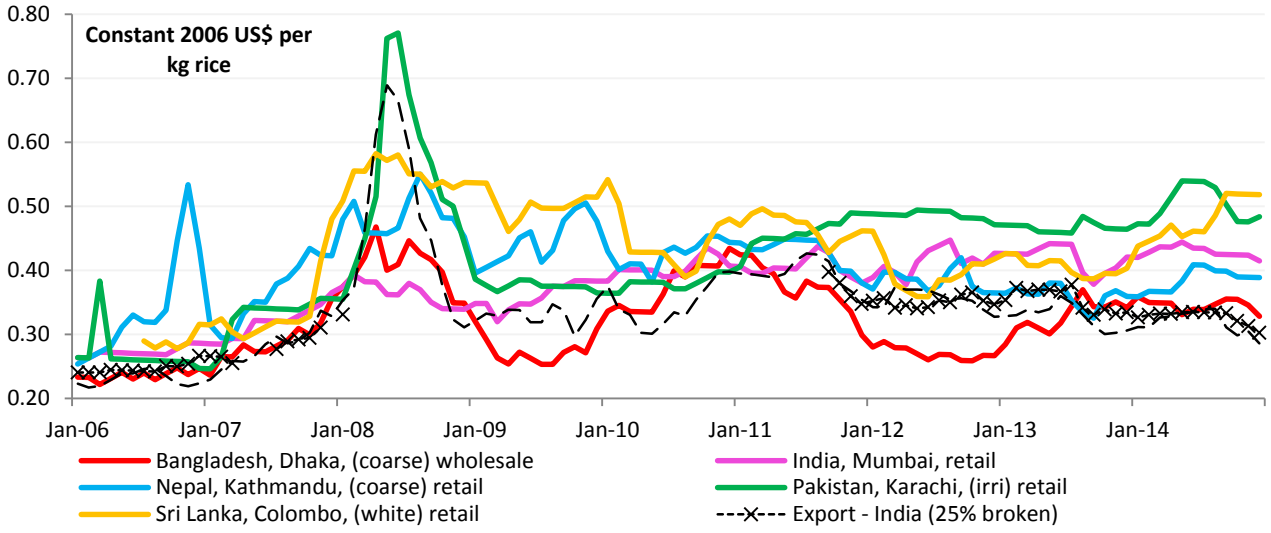
Figure A6: Rice prices in East and Southeast Asia, January 2006 to Dec 2014



Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

Among South Asian countries, Pakistan saw the sharpest spike in prices, followed by Sri Lanka: see Figure A6. Staples prices are far less volatile in India than prices of complementary foods – see Box A1.

Figure A7: Rice prices in South Asia, January 2006 to Dec 2014

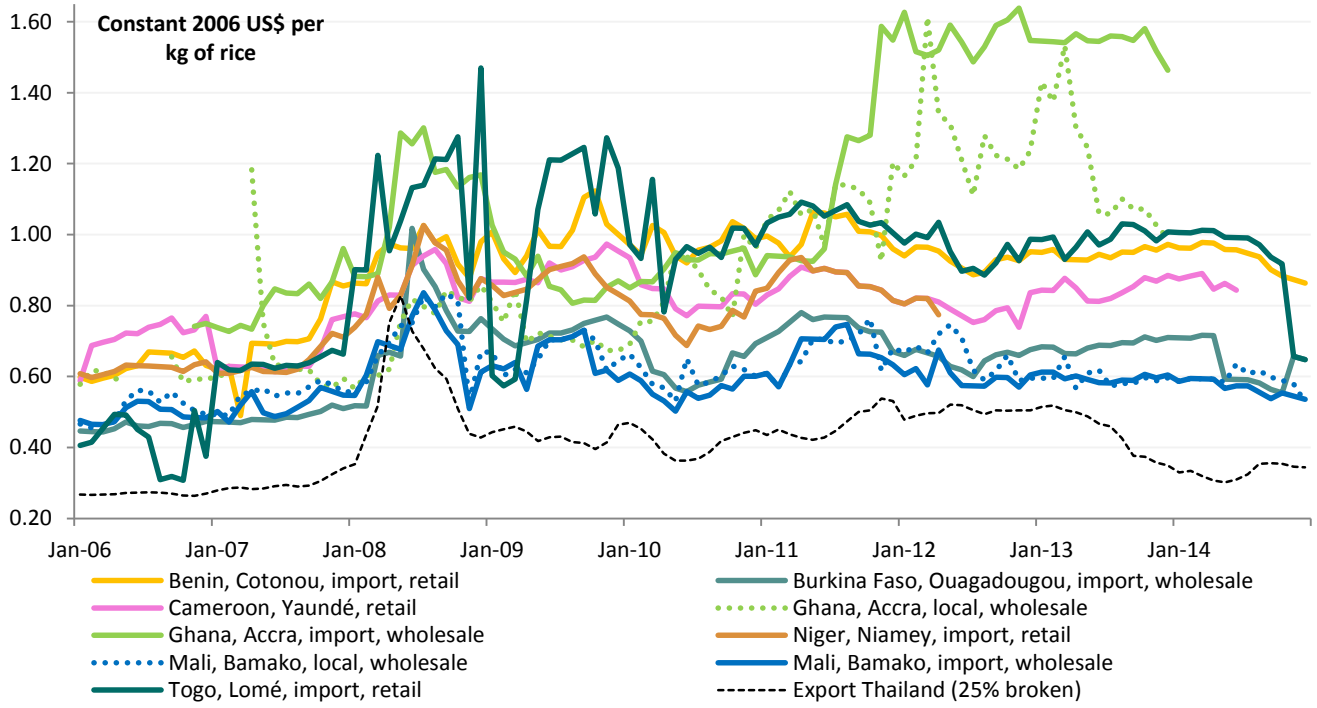


Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

Rice prices across West Africa are in many cases more volatile than those observed for the Asian examples shown. A significant wedge between the Thai export prices and most of these West African prices is also evident – a similar (though still slightly smaller) wedge was seen for the Philippines alone among the Asian examples. The GIEWS dataset also contains some prices distinguished between import and local rice – for Ghana and Mali in

this sample. Prices for Mali are remarkably similar across the two series, though larger differences are evident for Ghana. Indeed, imported rice price for Ghana is very high, and has been particularly high since around late 2011- perhaps the effect of taxes or tariffs.

Figure A8: Rice prices in West Africa, January 2006 to Dec 2014



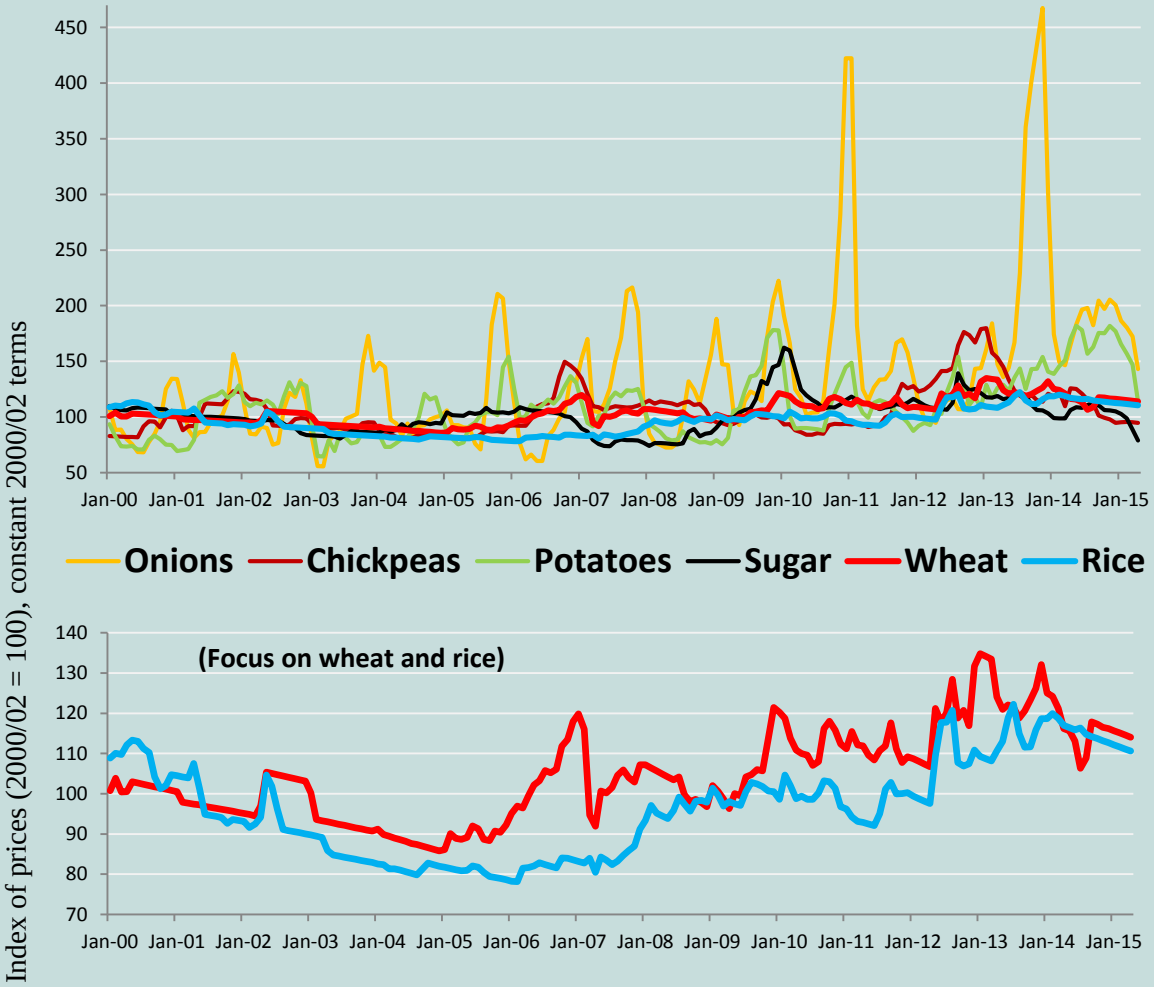
Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

Box A1: Complementary food prices volatile in India

Few may remember 2013 as a year of soaring onion prices – but it was for people in the world's second most populous country (see for instance Mallet, 2013). Indeed, while India keeps prices of key staples stable as a political necessity, prices of complementary foods are allowed to vary considerably more: see Figure A1.1.

The long-term trend for staples prices in India also appears to be going up in real terms – the case from around 2006 – while in between the turn of the century and 2006, these staples prices were falling in real terms.

Figure A1.1: Constant 2000-2002 retail prices of key foods in Mumbai, relative to their prices in 2000-2002: - January 2000 to April 2015



Source: Food prices from FAO GIEWS. Deflated by the Indian GDP deflator from the World Bank (monthly values imputed from annual figures and values for the deflator post-2013 also imputed)

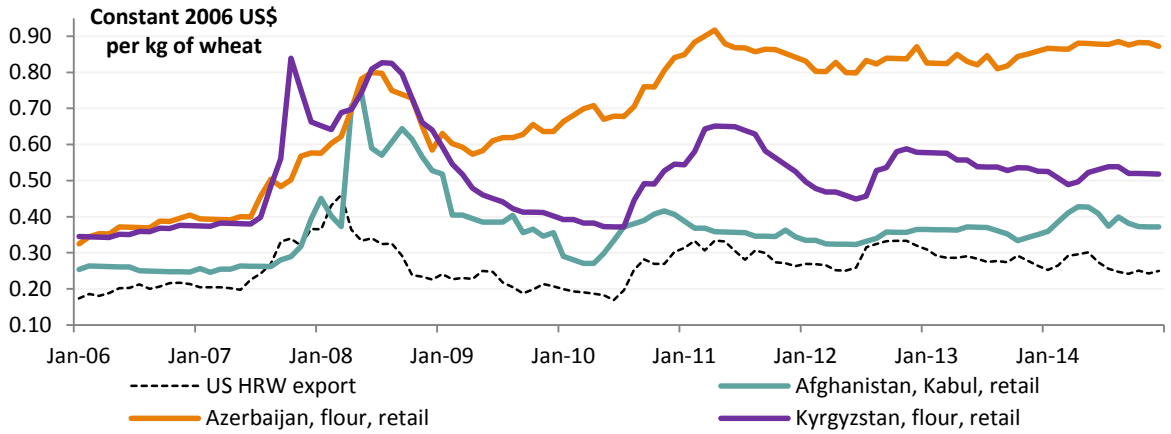
***Sources**: Mallet, V., Sep 16, 2013. Onion prices bring tears to Indian eyes. The Financial Times http://www.ft.com/cms/s/0/633c29f6-1eba-11e3-b80b-00144feab7de.html#axzz3YoFclso2 or Varma, S., June 20, 2014. Despite record onion yield, prices shoot up. Times of India http://timesofindia.indiatimes.com/business/india-business/Despite-record-onion-yield-prices-shoot-up/articleshow/36853238.cms*

Wheat

Following the 2007/08 GFPS, US (hard red winter) wheat prices price began another rise in mid-2010, but peaked in real terms below levels seen in 2008. After mid-2011, wheat prices have mostly trended downward in real terms, with a (relatively) small upswing in the middle of 2012. Since then, relatively plentiful harvests have helped prices to decline again.

In West Asia (Figure A9), prices followed broadly similar patterns to those observed in the US export markets, though in Azerbaijan prices have been rising steadily above inflation for the full post-spike period.

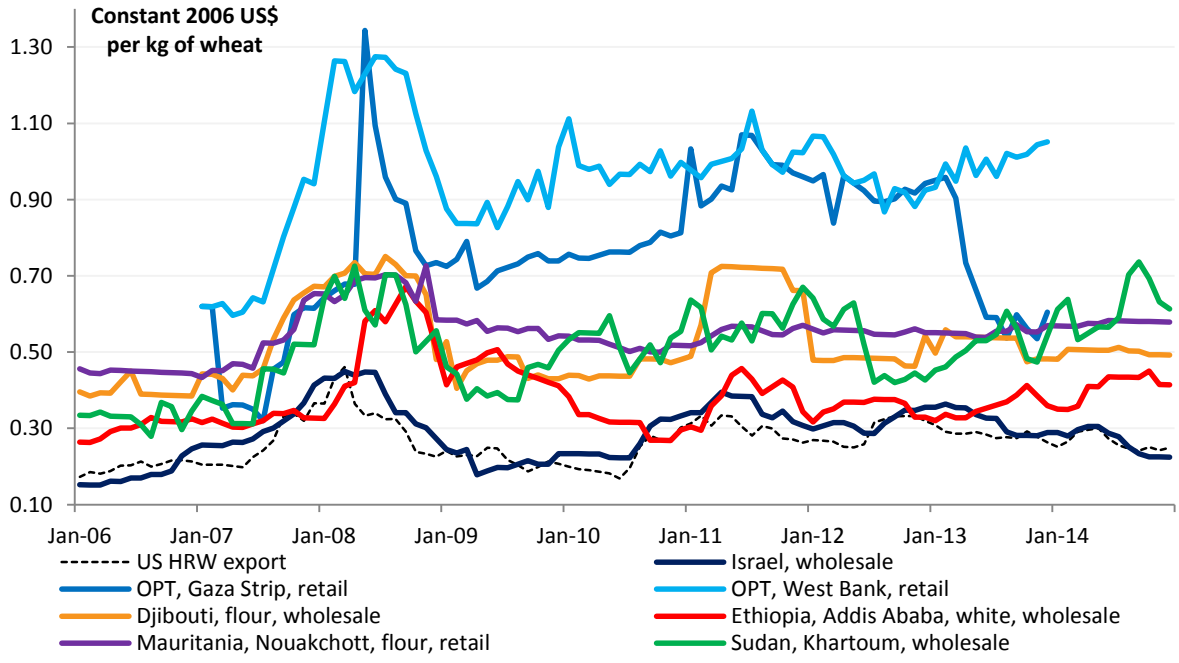
Figure A9: Wheat prices in West Asia, January 2006 to Dec 2014



Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

In the MENA region (Figure A10) by far the highest prices were observed in Palestine's West Bank and Gaza Strip. Indeed, compared to prices in Israel which closely resembled the levels seen in the US, wheat in the OPT was about triple the price.

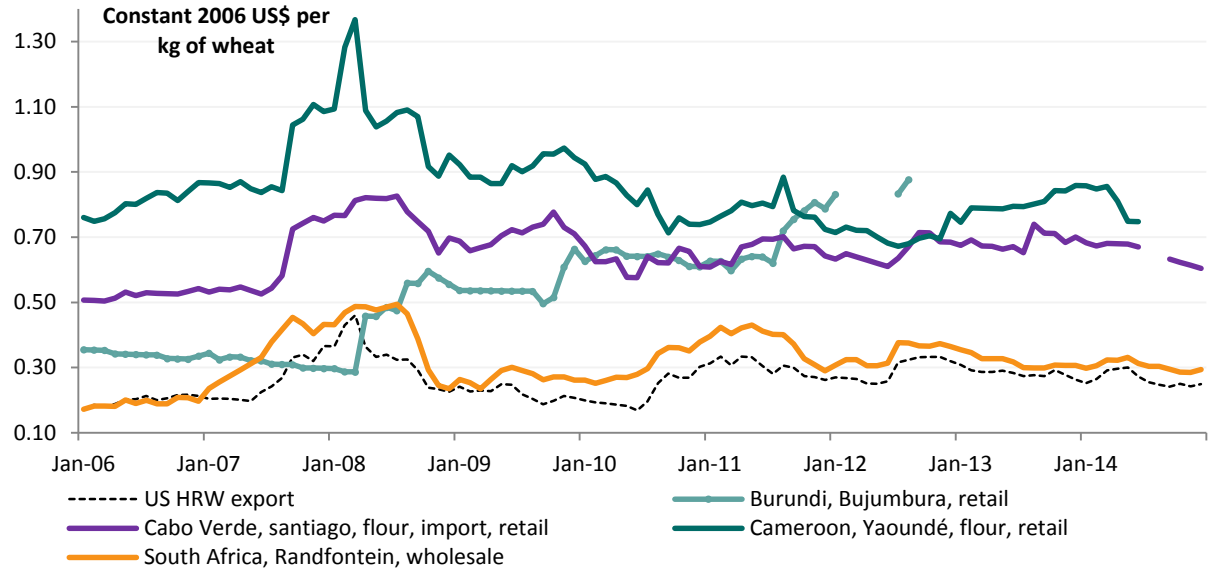
Figure A10: Wheat prices in the Middle East and North Africa, January 2006 to Dec 2014



Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

Wheat prices in a selection of sub-Saharan African countries are shown in Figure A10 – though it is not a particularly key staple for any of these.

Figure A11: Wheat prices in sub-Saharan Africa, January 2006 to Dec 2014

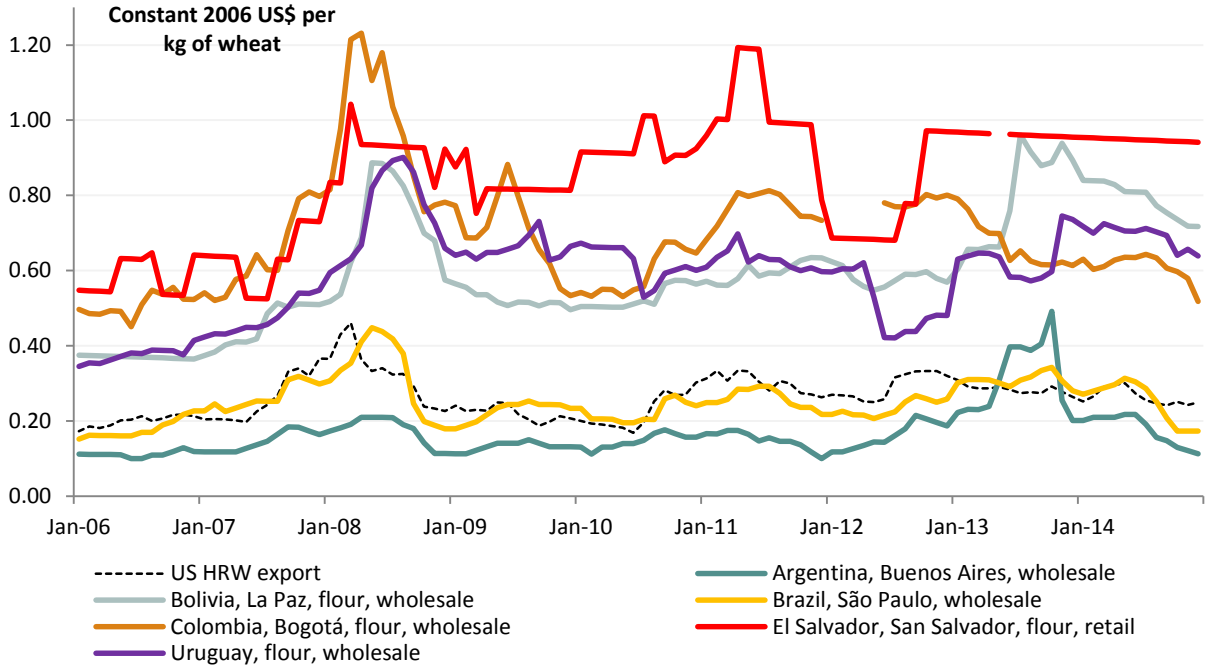


Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

Figure A12 shows wheat price trends in a selection of LAC countries, where Argentina's and Brazil's prices have often been lower than those in the US[13]. Also in a few of the available European examples (for wheat prices rather than flour prices) – Ukraine and Russia offer lower prices than those seen in the US(Figure A12).

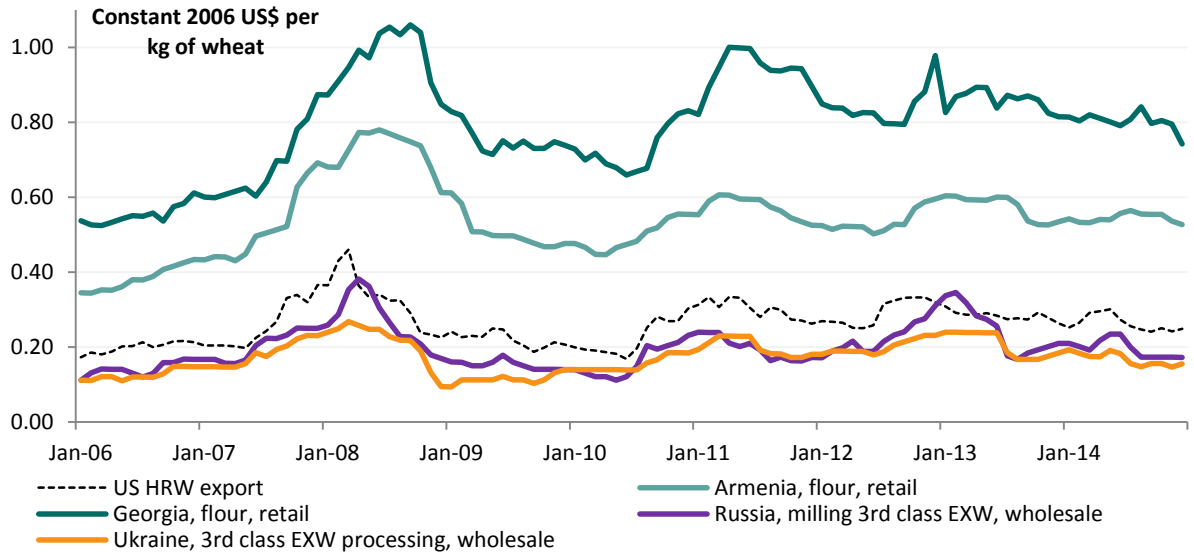
[13] It is difficult to compare some of the other levels to US wheat prices as many of the series shown here are for wheat flour, which will include a margin over the wheat grain price.

Figure A12: Wheat (and wheat flour) prices in Latin America, January 2006 to Dec 2014



Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

Figure A13: Wheat prices in Europe, January 2006 to Dec 2014

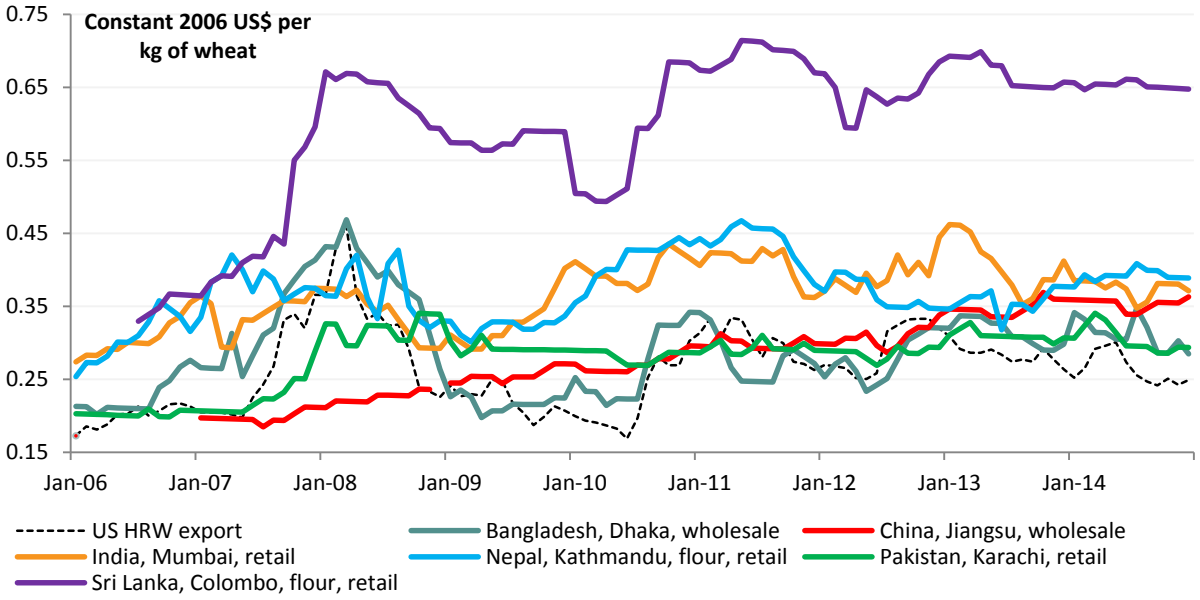


Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

Finally, Figure A14 shows wheat and wheat flour price trends in a selection of South and East Asian countries. Most saw spikes over the 2007/08 period, though China notably did not. China's prices have steadily risen above inflation however, so that they were close to levels seen in India[14] and Nepal by the end of the series.

[14] It is likely the Indian values, as retail values are for wheat flour as in the Nepalese case.

Figure A14: Wheat prices in South Asia and East Asia, January 2006 to Dec 2014

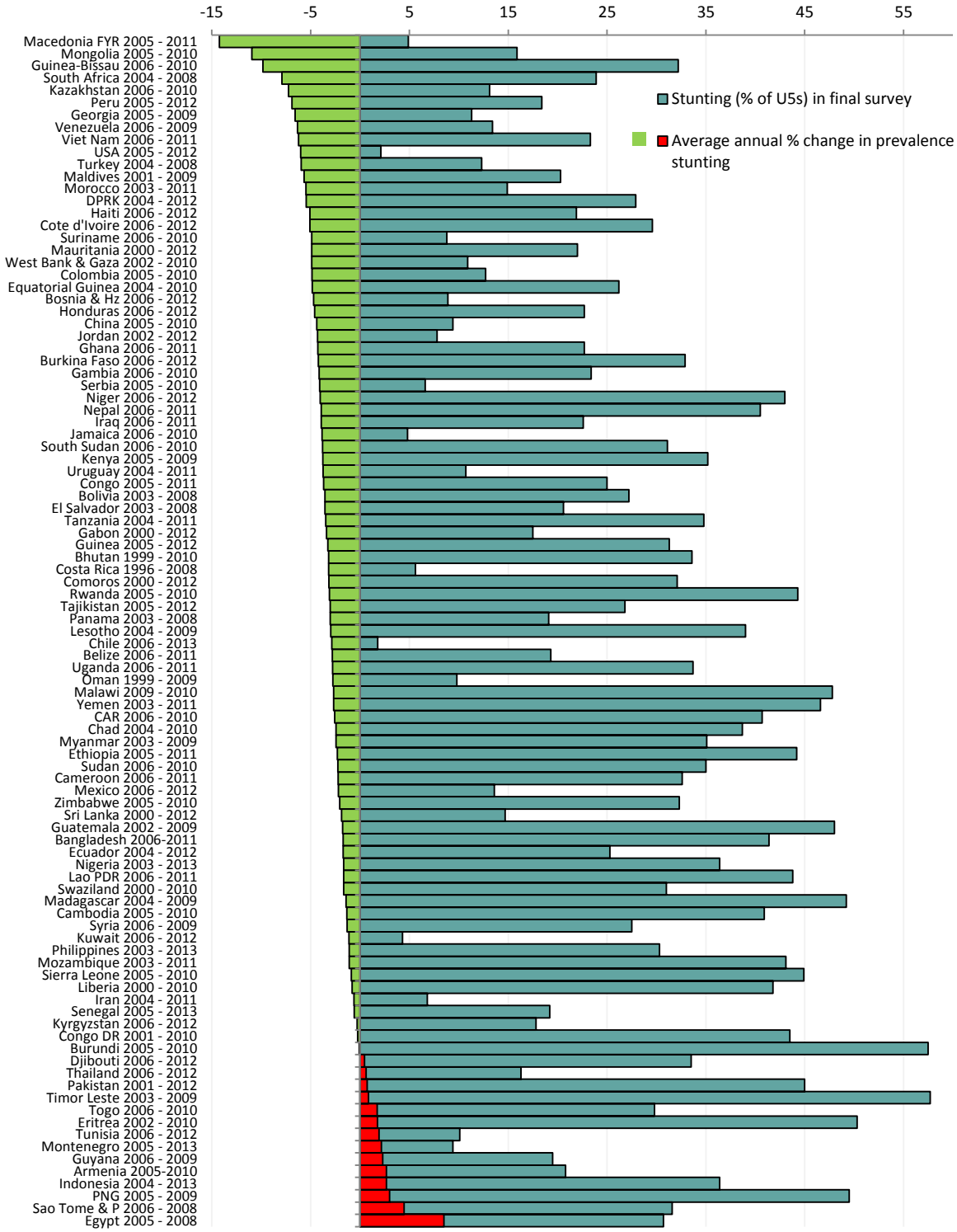


Source: Price data from FAO GIEWS, deflated by US GDP deflator from Bureau of Economic Analysis (annual figures used to impute monthly figures)

Annex B: Child stunting

Under-five stunting

Figure A14: Changes in stunting over the global food price spike period for 97 countries



Source: Joint Malnutrition Estimates database (2014) from UNICEF, WHO and the World Bank. Note: Countries with a data point prior to 2007/08 (closest to 2006 chosen) and from 2008 to 2014

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