Volatile world food prices & their implications

Supported by:

DFID Department for International Development

Grain stocks and price spikes

STEVE WIGGINS & SHARADA KEATS

Overseas Development Institute, London

7 September 2009

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Summary

This paper reviews the role stocks played in 2007/08 spike in world food prices and their potential for mitigating future food price volatility. It reviews available information on cereals stocks internationally; considers the role of stocks in the formation of the price spike; discusses historical experiences of price stabilisation schemes involving buffer stocks; and assesses current proposals to stabilise prices internationally. The data used come from published statistics, mainly those from FAO and USDA; academic and professional literature; and from interviews with key informants at FAO, the grain trade, and the International Grains Council (IGC).

Cereals stocks

Few countries collect data on stocks held by private farms and firms; hence most data are inferences from reported levels of production, trade and consumption. Since the data on these last three variables are subject to error, then estimates of stocks as residuals must be subject to wide confidence limits. Trends may thus be more reliable than actual levels reported. This is more than an academic point: at the turn of the century inferred Chinese stocks were revised upwards by 70M tonnes when it became clear that previous estimates had been too low.

Currently around 400M tonnes of cereals are in stock, down from more than 500M tonnes in the 1990s. The bulk of stocks are held in the United States and China, although Chinese stocks are effectively largely irrelevant to global markets since China trades very little grain and the stocks are meant to insure against domestic shortages and only exceptionally released on to world markets.

Stock-to-use ratios matter more than absolute levels. Looking at grain stocks since the early 1960s three patterns can be seen:

- China has consistently kept stocks proportionately much larger than the rest of the world, with ratios exceeding 70% for the key rice crop in the 1990s;
- During the last fifty years, world stock ratios were allowed to decline until the early 1970s, were then built up after the 1973/74 price spike, and then reduced after the turn of the new century; and,
- The low points in stocks-to-use ratios tend to coincide with price spikes. Three low points are especially evident for the wheat ratio: in the early 1970s, mid-1990s and in 2007/08. All three points were moments when cereals prices spiked, albeit in the mid-1990s by less than the events of 1973/74 and 2007/08.

Stocks played two roles in development of the price spike. In the years following 2000 falling ratios signalled the extent to which growth of demand for cereals was exceeding growth of supply. Once stocks had been reduced to a minimum threshold — that of the inventories necessary to permit grain trading and processing — then their power to cushion any short term shocks was gone. When, in 2007, harvests failed and the oil price reached levels that made biofuels economically attractive, all adjustment had to be on prices. And once these rose quickly and far enough, panic led to export bans, restocking — apparently particularly for rice — and speculation that exacerbated the initial price rises. Hence stocks, and the factors that led to changing stock levels, were fundamental to the price spike.

Previous attempts to stabilise prices

Examples include the Wheat Agreements of the 1950s and 1960s, and the commodity agreements set up for some tropical crops and minerals in the 1960s that operated until the 1990s. By and large,

these schemes only worked when supply and demand would have led to stable prices in any case. When they would not, the schemes failed — and sometimes catastrophically so.

After the last major food price spike in 1973/74 negotiations to establish global grain stocks to prevent such a spike reached an advanced stage before foundering on critical elements of the financing and management of the reserves.

Current proposals

At least eleven proposals have been put forward to prevent the price spike. They can be grouped as follows:

- Storage
    - emergency reserves for food aid,
    - internationally co-ordinated public grain reserves,
    - regional and national stocks;
- Virtual and para-reserves
    - virtual reserve to prevent speculative attacks in futures markets,
    - diversion of grains from animal feed and industrial uses when price spikes are forming;
- Information and co-ordination
    - More and better information on storage;
    - International food agency along the lines of the IEA to report on stocks and co-operate to ensure supplies in tight markets, and,
- Trade facilitation
    - International grain clearing arrangement
    - Prevention of export bans
    - Food import financing facility
- Establish production reserves.

They vary in terms of ambition and scope, technical challenges, the degree of international co-operation required, and their cost. Some are quite novel, others are variants on measures that have been taken in the past.

This paper reviews the proposals and indicates the advantages and drawbacks of the schemes — summarised in Table 3.1. Arriving at a firm judgment on the better options is beyond the scope of this paper: that would require detailed analysis of the proposals, and for some of these this would be a substantial task.

That said, the apparent weight of evidence and opinion would indicate the following judgments:

- An emergency food reserve and financing facility for the World Food Programme to ensure continuity of food aid and the ability to respond to emerging needs seems justified, although this does not deal with price spikes;
- It is far from clear that a system of co-ordinated public grain reserves could be made to work and would not deter private storage;

- Regional and national stocks may be justified in particular (and probably national) circumstances, but otherwise seem costly;
- A virtual reserve might be addressing a problem that does not exist. There are serious doubts as to its feasibility;
- Diverting grains from animal feed and industrial use, through use of options, could be a cheaper way to obtain food to be channelled to poor and vulnerable people when price spikes are forming. Given administrative costs it may only be attractive where governments or agencies are committed to delivering food to the vulnerable;
- Proposals for more reporting of stocks and co-ordination could be useful. Some are sceptical that reporting of stocks could be improved given that so much is held privately and stock holders would have little or incentive to reveal what they hold; but given that some countries are able to collect reasonably detailed data, this cannot be so difficult if the will were there. These ideas look to be things that FAO might lead or carry out;
- There is plenty of support for negotiating under the WTO to have export restrictions banned or severely curtailed;
- An international clearing house for grain trading is intriguing, but perhaps needs more work on the detail to explore its feasibility and desirability;
- The proposed food import finance facility seems to replicate an existing IMF scheme that needs to be made more agile, a task that the Fund apparently has in hand; and,
- Production reserves would produce food too late to prevent spikes and potentially act pro-cyclically, driving prices down when they are already falling

This suggests that the proposals for an emergency reserve and outlawing export bans deserve pursuing. The same may be said of trying to get better information on stocks. For some countries and agencies, the proposal to see how options and other contracts might be used to divert grain from other uses to food may be useful. More detail is needed on the international grain clearing house. Ideas about an international food agency and a food import financing facility can be seen as calls for FAO and IMF, respectively, to work more effectively on their mandates.

Introduction

This paper reviews the role stocks played in 2007/08 spike in world food prices and their potential for mitigating future food price volatility.

To do so the paper:

- reviews available information on cereals stocks internationally;
- considers the role of stocks in the formation of the price spike;
- discusses historical experiences of price stabilisation schemes involving buffer stocks; and
- assesses current proposals to stabilise prices internationally.

Large stocks of cereals may be held publically for at least three main purposes:

- Providing food aid, and assuring that there are adequate supplies to meet emergency needs for such aid;
- Stabilising national prices and ensuring that countries have access to a reserve of food to cover against international shocks. Regional reserves are a variant on this; and,
- Stabilising international prices in world markets.

This paper is largely about the last issue: the holding of stocks to mitigate international price volatility. The first two points are discussed to some extent, primarily through the relation that international price instability has on national stockholding and food aid policy.

The data used come from published statistics, mainly those from FAO and USDA; academic and professional literature; and from interviews with key informants at FAO, the International Grains Council (IGC), and grain traders.

1. Cereals stocks

1.1 Statistics and reporting

At least three agencies collect and publish information on grain stocks: FAO, IGC and USDA. Two key points were made by those interviewed in FAO and the IGC:

- Few of the data reported on stocks are derived from direct observation, with India and the US being main cases where serious attempts are made to record stocks. The US releases quarterly estimates of grain stock held on-farm and off-farm[1]. Elsewhere stock levels are estimated as the difference between opening stocks, production, and consumption. Given the margins of error on these last two statistics, then any computed statistic from them must be subject to very wide confidence limits[2]. Hence informants insisted that they used their stock figures less for the levels, but more for the trends — a reasonable inference, so long as the errors tend to be the same direction from year to year; and,

[1] See Annex I for a description of these US estimates for maize and wheat

[2] OECD/FAO and USDA stock estimates differ. For example, over the 2006 to 2008 period, OECD/FAO estimates reported average annual world wheat stocks of 174 million tonnes (OECD,FAO 2009), about 25% higher than USDA estimates of 139 million tonnes over the same period (USDA FAS). Moreover this was not owing to big differences in estimates of global wheat production and consumption which were respectively 629 mt and 629 mt for OECD/FAO over the period, and 630 and 621 respectively for USDA over the corresponding period. The story is similar for other cereal stock estimates.

- **Stocks data are reckoned at the end of the specific crop marketing year for any given** country[3]. Stocks vary through the marketing years and the data do not necessarily reflect stocks at other times and it is assumed that stocks do vary through the year.[4]

Data sources do not usually distinguish between public and private stocks, but it is known that the former have declined over the last two decades or so as governments have felt less need to maintain strategic stocks — thanks to the ending of the cold war, as confidence in markets has grown, and as holding public stocks has come to be seen as an unnecessary use of taxpayers' money.

The difficulties of knowing what is in stock can be illustrated by a couple of points. Who knows what is held in China, above all in the granaries of millions of small farmers, and where reporting to Beijing from the Provinces on stock levels may in part be political? Box A tells a cautionary tale about estimating Chinese stocks. The other comes from Peter Timmer (2008) who asks, what would be the impact on world rice markets if every rice-consuming household in Asia decided to hold one week more of rice supply in their larders? His somewhat disconcerting answer is that the amount would be quite enough to cause the very large spike seen in rice prices in early 2008.

[3] In the case of USDA data. FAO reports by calendar year and IGC at the end of the N Hemisphere marketing season. See Table I.1 in Annex I for USDA marketing years of recent top stockholders of maize, rice, and wheat

[4] See figures in Annex A for estimates of US stock variation through the year

Box A: Chinese grain stocks at the turn of the century

Major revision of estimated Chinese stocks

Before May 2001 USDA estimated China's maize stocks at 32M tonnes. When the balance between stocks, production and consumption was computed it was heavily in the red: it was evident that consumption was being sustained by drawing down on stocks that had to be far more than the 32M tonnes previously registered. Consequently stock levels for end 2000/01 were revised first to 80.5M and then 102M tonnes.

Since China tends to hold very large stocks, these revisions had a major impact on world stock aggregates. At end 2000/01 they were in total reckoned to be 175M tonnes, with no less than 102M tonnes being held in China.

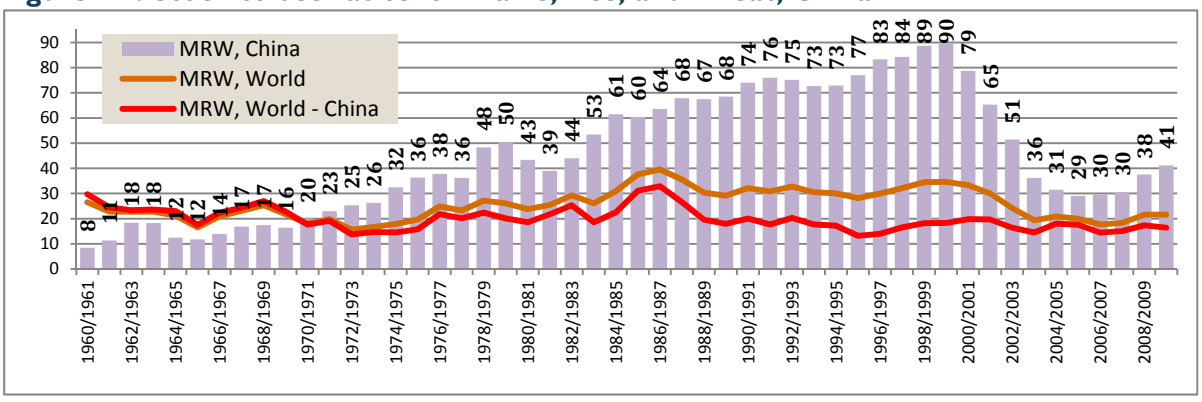
China's stocks and world trade

Given that China scarcely enters the world cereal trade, being deliberately largely self-sufficient, Chinese stocks can be seen as irrelevant to the world market. They exist solely to deal with Chinese fluctuations. They are hardly likely to be supplied to the world market, no matter how high the world grain prices rise; although an exception occurred with maize in 2003 when Chinese stocks were released in response to a small spike in international prices.

Although over the last ten years China has been the third largest exporter of maize, the sixth largest rice exporter, and the eleventh largest wheat exporter — see Box B, the volumes exported are only a small percent of the last decade's international trade, which saw over 75% of exports concentrated in the top two exporters for the case of maize, and the top five in the cases of wheat and rice. Chinese exports also represent a very small proportion of Chinese stock.

Indeed, the Chinese stocks play a disproportionate role in world stocks. If these are omitted from world stock levels, the much commented sharp decline in the stocks-to-use ratios seen since 2000 evaporates. Both USDA and FAO (Dawe 2009) have done the sums. The figure below shows stock-to-use ratios for the three main grains in China, the world, and the world except China. Figures 1.3, 1.4, and 1.5 illustrate this individually for maize, rice, and wheat respectively.

Figure A1: Stock-to-use ratios for maize, rice, and wheat, China



Source: Constructed using data from USDA FAS

It may still be, however, that the world statistics do affect trader expectations whether or not China is likely to release stocks on to the international markets, since reductions in Chinese stocks increase the possibility that in the event of a poor harvest China would import from the world market.

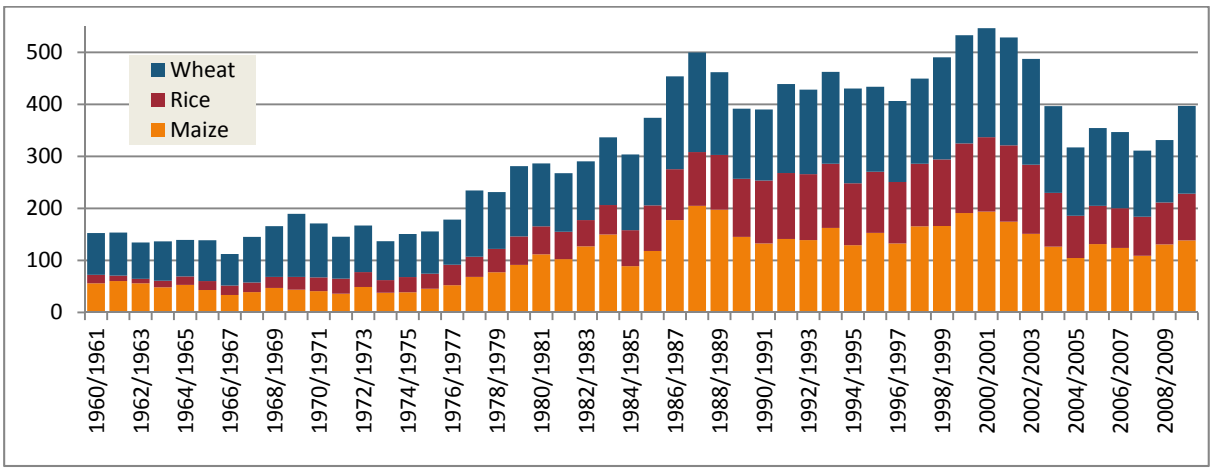
Sources: Dawe 2009, Defra Food & Farming Group 2009, Hsu & Gale 2001, USDA

Over the last 10 years, USDA has reported stocks data for maize and/or rice, and/or wheat for 90 countries. It does not publish data on stocks held in 48 additional countries — see Table I.2 in Annex I lists these countries by region — for which it provides data on consumption of at least one of the three main cereals. Data from Sub-Saharan Africa are particularly sparse. In some cases (such as that of Afghanistan), stock levels were reported in the past but have not been reported recently. Overall this suggests that estimates of stocks may be slightly underestimated where data for certain countries are not available.

1.2 Overview of world cereals stocks

From the data publically available, how much stock is held globally, and where? Figure 1.1 provides a breakdown of maize, rice, and wheat stockholding globally, as estimated by the USDA, [5] while Figure 1.2 presents the same data by region. [6][7]

Figure 1.1: World wheat, maize, rice stocks; beginning marketing year, M tonnes



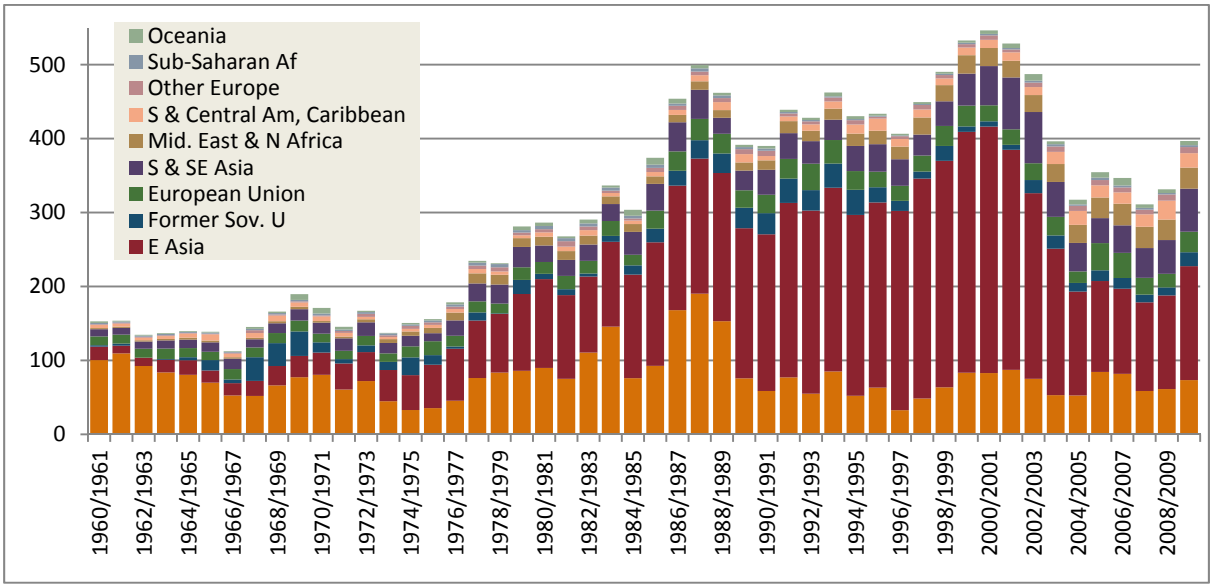
Source: Constructed using data from USDA FAS. Note: USDA presents data for the cereals marketing year, running 1 July to 30 June

[5] Estimates by FAO are also publically available, but USDA crop stock estimates differ in three main ways; 1) USDA reports using marketing years while FAO uses calendar years, 2) USDA compiles information from a variety of available sources — Including official country statistics, reports from agricultural attaches at US embassies, data from international organisations, publications from individual countries, and information from traders inside and outside the country — while FAO is obliged to used member countries' official statistics where they exist, and 3) USDA data is more up to date and provides current year projections.

[6] Definitions of USDA regional aggregates are available here: www.fas.usda.gov/psdonline/psdRegions.aspx

[7] Figure I.3 in Annex I shows the breakdown at the top of figure 1.2 (where the stockholders are relatively small) in more detail. Figure I.4 in Annex I provides a breakdown of proportional shifts in regional stockholding by decade, over the last 5 decades.

Figure 1.2: Maize, rice, and wheat stockholding by region; beginning stocks, M tonnes



Source: Constructed using data from USDA FAS

Box B: Top dozen exporters of maize, rice & wheat

The tables below present the volume of maize, rice, and wheat exported by the largest dozen exporters[8] of the last decade (1998/99 to 2007/08). The ten year averages of each country's exports are expressed as a percentage of 1) total global exports, and 2) national stock.

On average, certain large exporters—notably **Argentina** and **Uruguay**—keep very little stock in relation to how much they export, while other such as **China** and **India** export relatively minor amounts in comparison with total amounts held in stock.

Table B1: Exports as percent of global total and percent of national stock

Largest dozen maize exporters 1998/99 – 2007/08				Largest dozen rice exporters 1998/99 – 2007/08				Largest dozen wheat exporters 1998/99 – 2007/08			
	A	B	C		A	B	C		A	B	C
US	63	63	130	*Thailand	29	29	390	US	26	26	160
Argentina	15	77	2,100	*Vietnam	15	44	410	Canada	15	41	220
*China	8.6	86	10	*India	15	59	32	EU	14	54	86
*Brazil	5.2	91	150	US	11	70	330	Australia	13	67	340
South Africa	1.4	93	84	*Pakistan	8.8	79	700	Argentina	9.2	76	1,200
Ukraine	1.4	94	120	*China	6.2	85	3	Russia	6.0	82	220
*India	1.0	95	310	*Egypt	2.7	88	150	Kazakhstan	4.6	87	370
Paraguay	1.0	96	93	Uruguay	2.5	91	1,600	Ukraine	3.1	90	250
EU	0.87	97	17	Argentina	1.4	92	260	*India	1.7	92	15
Canada	0.51	97	36	Burma	1.2	93	33	Turkey	1.7	93	120
*Thailand	0.39	98	130	Australia	1.1	94	170	*China	1.5	95	3.0
Serb & Mtn	0.32	98	67	EU	0.89	95	28	*Pakistan	0.57	95	28

A = Exports as a % of global exports
B = Cumulative % of global exports
C = Exports as % of stock

- Countries which instituted export bans or restrictions in response to the 2007/08 food price spike appear in yellow.
- Countries that released stock nationally at a subsidized price **appear with * in bold red**[9]

Source: USDA FAS; Demeke et al, 2009
Note: National stock expressed as an average of beginning year stocks (which in any year, t, equal ending

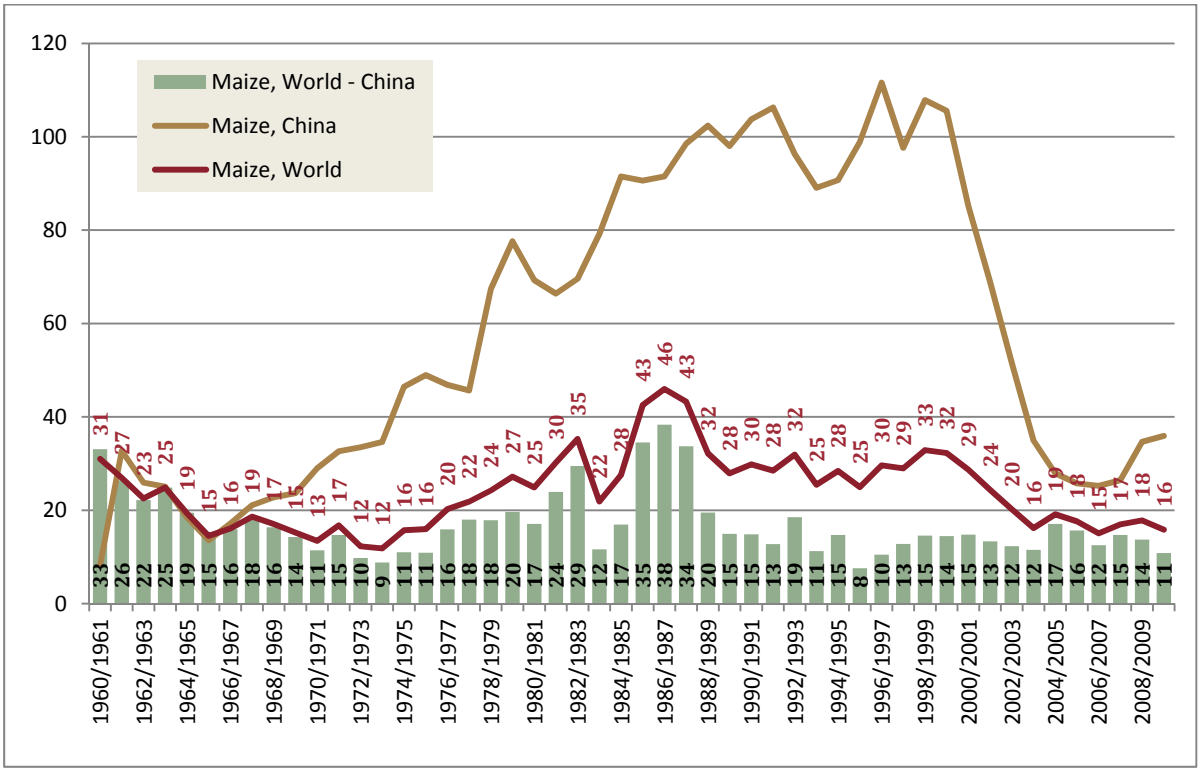
[8] Treating the EU as a single exporter
[9] FAO GIEWS provides a breakdown of country responses here: www.fao.org/GIEWS/english/policy/index.asp

stocks in year t-1)

The vast majority of stocks are held in East Asia, mainly China, and North America.

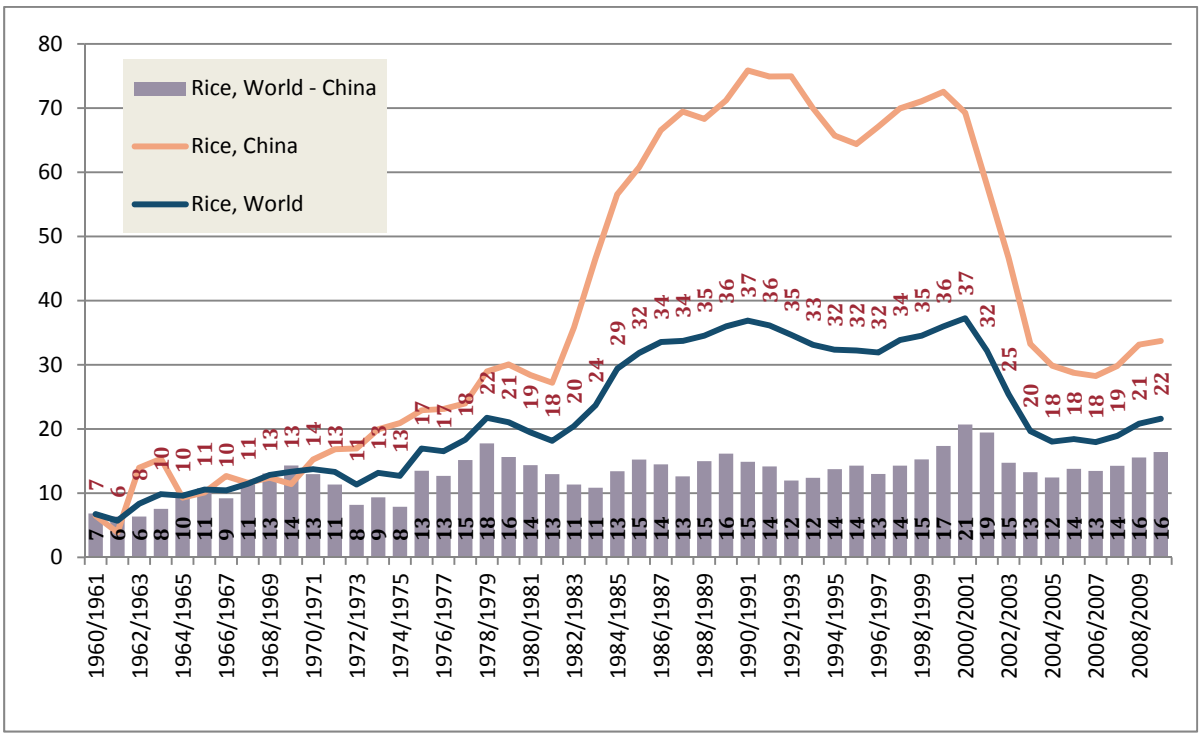
Stock-to-use ratios compare ending stocks to consumption in any given year, and are commonly used to indicate relative 'tightness' of grain markets. Figure A1 in Box A shows stock-to-use ratios for maize, rice, and wheat combined. The following figures disaggregate this by crop, showing ratios for **China, the world**, and the **world except China**—with a focus on the last simply because China is such a large stockholder with significant influence on world trends. Data labels in black show stock-to-use ratios for the world except China, while those in red show stock-to-use ratios for the whole world.

Figure 1.3: Maize stock-to-use ratios. World, China, and World except China



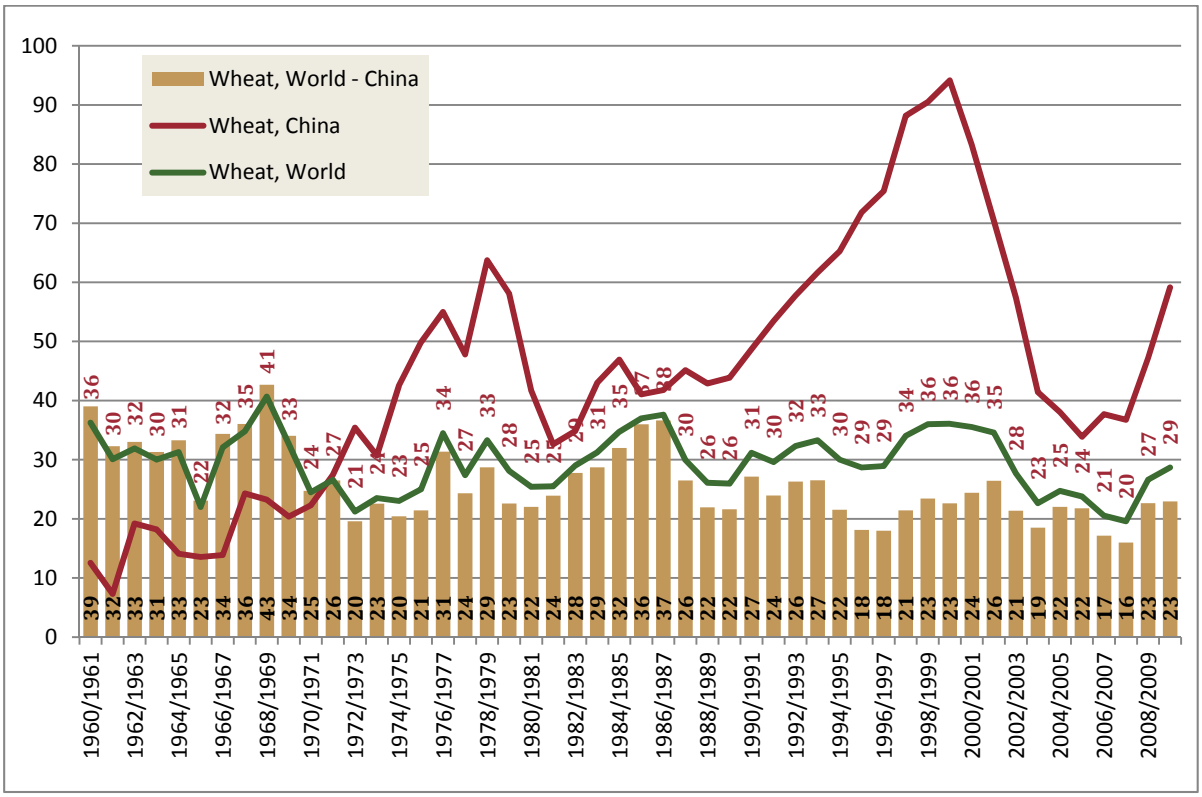
Source: Constructed using data from USDA FAS

Figure 1.4: Rice stock-to-use ratios. World, China, and World except China



Source: Constructed using data from USDA FAS

Figure 1.5: Wheat stock-to-use ratios. World, China, and World except China



Source: Constructed using data from USDA FAS

Three patterns emerge from these charts of stock-to-use ratios:

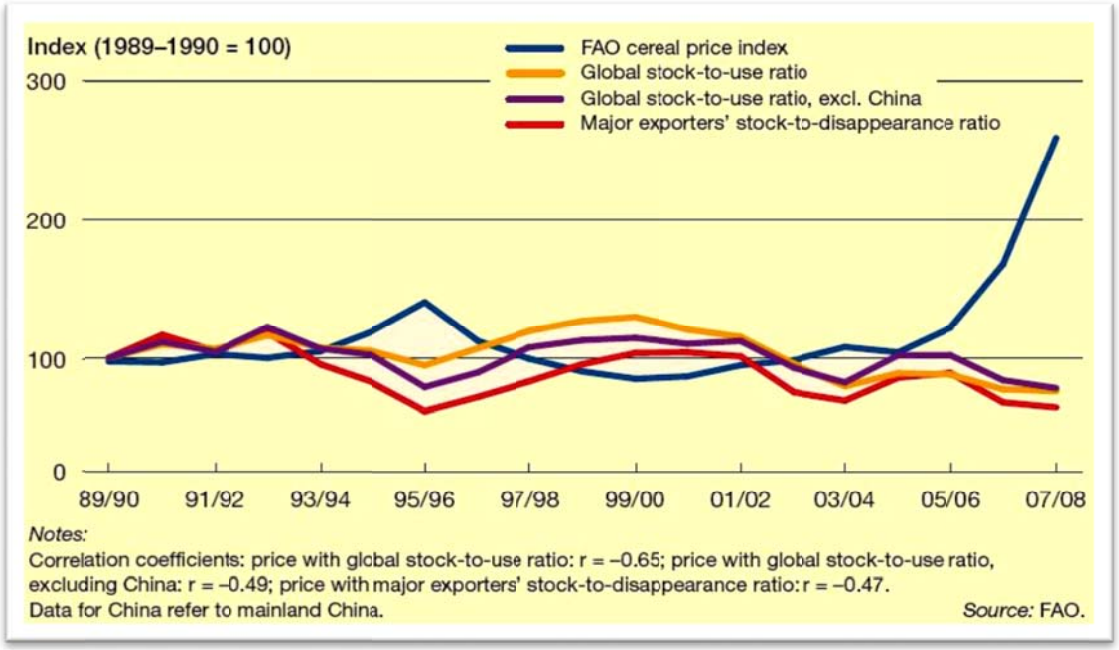
- China has consistently kept stocks proportionately much larger than the rest of the world, with ratios exceeding 70% for the key rice crop in the 1990s.[10] There seems also to be more variability in China's ratios, although some of the variation may be down to mis-estimation of the true statistic;
- During the last fifty years, world stock ratios were allowed to decline until the early 1970s, were then built up after the 1973/74 price spike, and then reduced after the turn of the new century; and,
- The low points in stocks-to-use ratios tend to coincide with price spikes. Three low points are especially evident for the wheat ratio, in the early 1970s, mid-1990s and in 2007/08. All three were moments when cereals prices spiked, albeit in the mid-1990s by less than the events of 1973/74 and 2007/08. For wheat it seems that a critical threshold lies around 20%: once the ratio dips below this, then spikes seem to be highly likely.[11]

1.3 The role of stocks and the 2007/2008 cereals price spike

What role did stocks play in the price spike?

As noted, price spikes coincide with low stock-to-use ratios — see Figure 1.6 in addition to previous graphs. Most of the more important papers[12] explaining the recent price spike stress the importance of the fall in stock-to-use ratios that preceded the price spike.

Figure 1.6: Relationship between cereals stock ratios and cereals price



Source: FAO, August 2009.

[10] At the June 2009 World Grain Forum a Chinese delegate reported that China was aiming to hold grain stocks equivalent to 70% of use.

[11] The observant will see that this threshold was breached in 2003/04. A price spike did not result at the time since China released stocks on to the world market.

[12] Including Abbot et al., Collins, Mitchell, Timmer, and Trostle — all 2008.

Stock ratios, however, tend to be the result of the varying growth of demand and supply in preceding years.[13] It is these movements in fundamentals that lie behind price changes. Stocks, of course, can be released to cushion price increases that would otherwise take place. But this can only happen for limited time: when stocks approach a sufficiently low point, presumably that at which stocks represent the necessary amount to balance out seasonal harvests against the steady demand of consumption,[14] further releases of stocks cease and all adjustment takes place in prices, so that prices may then rise rapidly.

This, however, does not fully explain the recent price spike. Most analysts explain the spike as combination of factors applying over the medium term, short-run triggers, and the positive feedback that then arises from the initial price rise. In the case of 2007/08 the medium term factors include the slow-down in growth of production of cereals since the mid-1980s in contrast to rising demand that meant for several years in the 2000s global consumption exceeded production, as well as the rising oil price pushing up costs of production and transport of cereals and, after passing a threshold value in the region between US$60 and US$70 a barrel of oil, stimulating demand for cereals to be used for ethanol distillation. Added to this in Gilbert's analysis is the general macro-economic environment of rapidly rising aggregate demand and an expanded money supply. The decline in the value of the US dollar against other currencies also contributed to inflation of commodity prices in dollar terms.

The medium-term trends were pushing up cereals prices from 2002 onwards, but by modest amounts. Those studying the markets, including the grain trade, were acutely aware that as the stock-to-use ratios fell, the market was vulnerable to short-term shocks. So, for one grain trader, the price spike was not unexpected, but the timing and the magnitude were.

The short-run triggers include the harvest failures of 2006 and 2007 plus the 2005 Energy Act in the US with its mandates for biofuels production and its discouragement of the use of MTBE as a petroleum additive.

Finally positive feedback came from export bans, reduction of import tariffs, attempts to restock by governments during a tight market — see next section, and possibly from increased investment in cereals futures — see later comment on the role of speculation.

Stocks thus played two roles in the price spike. They were falling in large part since growth of demand was faster than that of supply and signalled those changes. Once reduced to critical thresholds, there were no longer sufficient to prevent the short-term triggers driving prices up strongly and thereby prompting the panic reactions that accelerated the price rises.

---

[13] But not entirely. Trostle (2008) explains the other factors:

> At the same time, policy decisions in China led to a reduction of its grain stocks. And elsewhere, there were incentives for governments and the private sector to reduce stocks. Government-held buffer stocks were deemed to be less important after nearly two decades of low and stable food prices. For the private sector, the cost of holding stocks, use of "just-in-time" inventory management, and years of readily available global supplies provided incentives to reduce stock holding. Over the last decade, the shift toward more liberalized trade reduced trade barriers and facilitated trade, which in turn reduced the need for individual countries to hold stocks. (13)

[14] While conceptually there may be a threshold ratio of stocks to use, a precise figure for this is elusive. Indeed, FAO once had 17–18% as a marker below which international warnings would be issued, but this was abandoned on the grounds that it might be wrong. Grain traders refuse to be drawn on this. Wright (2009) mentions 20% as benchmark below which only very high prices are likely to tempt stock holders to release supplies.

Attributing significance to one factor or another in the price spike is not easy, given the complex way that the various cases contribute. Take away one or other of several of these factors and there would have been no price spike, but that does not mean then that each of these was the cause of the event. Indeed, Abbott et al. comment:

> There is no doubt that the causes of the current agricultural commodity price increases are complex. We make no attempt to derive percentages attributable to the many disparate causes, and, indeed, think it impossible to do so.[15]

That said, it is clear that the low levels of stocks to use by 2007 prevented adjustment in quantity rather than by price. Lack of stocks then allowed the short-term triggers to push up prices significantly, and this in turn led to reactions that accelerated and exacerbated price movements. Hence stocks, and the factors that led to changing stock levels, were fundamental to the price spike.

1.5 Restocking during the price spike

Reactions to rising prices included some governments that tried to build their stocks, despite the rising prices. Many of these cases concern rice. When India began to restrict exports in September 2007, alarm spread and some reactions can only be described as panic.

A more complete documentation of these restocking attempts is in progress, but it is reasonable to believe this took place to some extent. For example, Timmer (2008), reports on moves to build rice stocks:

> As an example, the Government of Malaysia announced in July that it was doubling the size of the national buffer stock held by Padiberas Nasional Berhad, even though it had to pay extremely high prices to do so. The Philippines is seeking to increase its government-held stocks. Indonesia has announced plans to triple its level of buffer stocks to 3 million metric tons. [82]

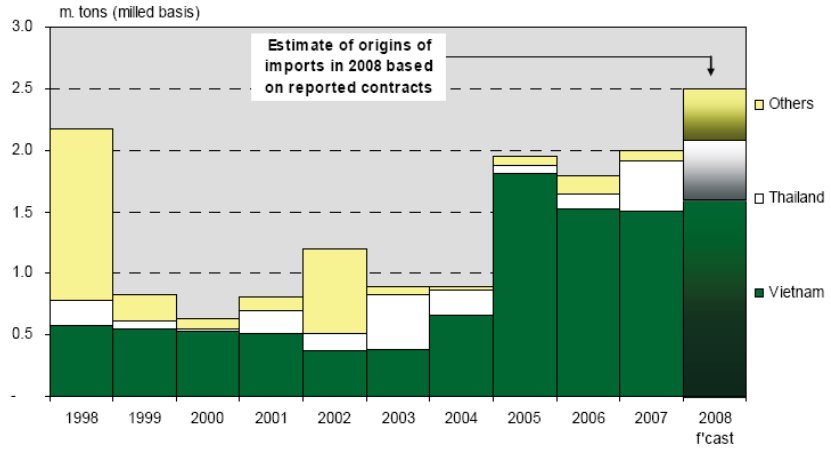
USDA data offer some indication that stocks of a number of relatively major stockholders were built up (either through increased imports, domestic production, reduction in exports, or reduced consumption[16]) over the year (though it is impossible to say exactly when). This was the case for China, India, Indonesia, Thailand, Pakistan, Malaysia, Bangladesh, Egypt, and Saudi-Arabia. These data can be slightly misleading; for example, the Philippines stock in mid 2008 was lower than in mid 2007, but not because they weren't importing over the period of the spike; see figure 1.7. Despite having a fairly good crop, the Philippines imported well above average levels, increased imports from non-traditional suppliers[17]—and tendered for more than they secured. Globally, rice market trade contracted in 2008, though there was a point at the beginning of the year (around February) when it was on an expanding trend and the IGC projected it would grow—which serves to highlight the uncertainty at the time surrounding availability and import requirements. Perceptions of high demand at this time likely fed into clamp-downs on exports.

[15] In contrast, Mitchell treats the various causes as additive and so was able to attribute as much as 75% of the price spike to biofuels — and to other factors including reduced stocks. He was then misquoted frequently by those who omitted the other factors, leaving three-quarters of the blame with biofuels.

[16] This last is unlikely in most cases, but can occur –for example South Korean demand for rice has reduced in recent years in favour of wheat.

[17] Other countries also increased imports from 'unusual' channels, mostly those with historically strong reliance on India.

Figure 1.7: Rice imports to the Philippines; by origin



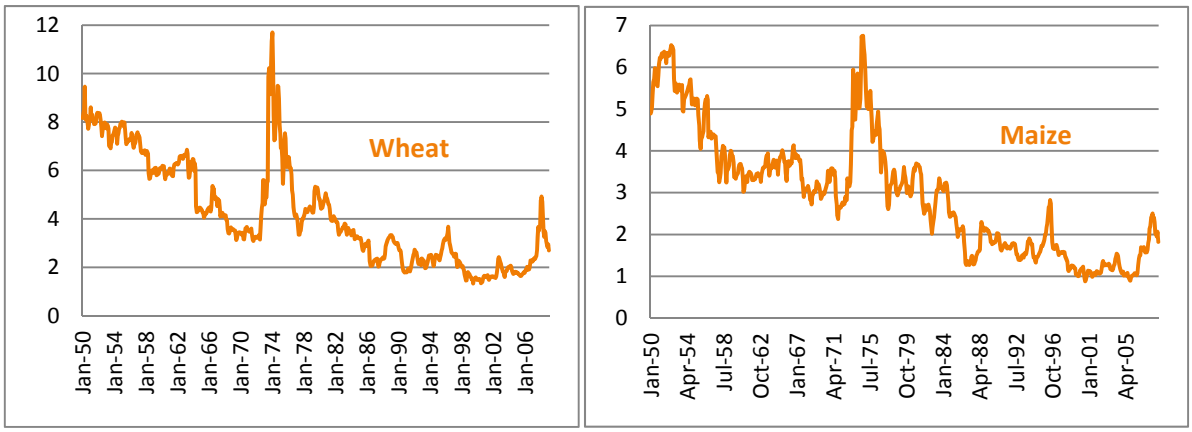
Source: International Grains Council; Grain Market Report 380; July 2008

Other countries that appear to have reduced stock levels from one year to the next (or to have kept less than intended) over the period of the spike may have done so because of an inability to maintain stock levels even if they were restocking—owing to; tight market conditions and high prices, adverse weather conditions hampering domestic production, large releases of stock to buffer price impacts on vulnerable groups, or any combination of these—rather than a policy decision to hold less stock *per se*.[18]

2 History of attempts to stabilise prices

Price volatility is nothing new, and the recent spikes do not look particularly out of place when a long-term trend in price volatility is examined. Similar spikes have occurred in the past, most notably and dramatically in 1973/74, but also 1996/97 (see Figure 2.1). It is thus useful to examine the historical experience of price stabilization policies to inform current understanding of the landscape.

Figure 2.1: Long term trends in US wheat and maize prices, 1950–2009, US$ per bushel



Note: Prices are in dollars per bushel, deflated by US CPI (1982-1984 = 1)
Source: Wright, 2009

[18] For example, Côte d'Ivoire and Senegal imported less overall owing to reduced availability from traditional trading partners (India mainly), and high prices. Countries such as Burma saw domestic production (and subsequently stocks) decrease as a result of cyclone damage. Countries such as Peru may have seen reduced stock levels via distributing more than they replenished. The situation of the Philippines also fits into the first and third categories. For these reasons, a cursory examination of stockholding data reckoned for end of marketing years can mask levels of restocking that took place around the time of the spike.

2.1 International Commodity Agreements (ICAs)

International commodity agreements were broadly proposed as part of a new international order at the end of the Second World War. By the early 1960s, only five were in place—for wheat, sugar, coffee, tin, and olive oil; accounting for about 10 percent of globally traded primary commodities—and only wheat and tin qualified as producer-consumer agreements with provisions to influence global trade (Shaw, 2007).

The history of International Commodity Agreements is mostly poor. Gilbert (2005) looked at Tin, Sugar, Rubber, Cocoa, and Coffee agreements, and contended that most were unsuccessful because they were not prepared for ever-decreasing prices. The exception was the ICA for Rubber (INRA), which contained semi-automatic procedures for upward and downward revision of its price bands. This meant however the agreement smoothed rather than stabilized prices, because it followed market prices to some extent. The tin agreement, classically, collapsed because it was attempting to hold prices too high without enough financial backing. Cocoa and Sugar agreements were too weak to achieve any of their objectives. The coffee and rubber agreements lapsed rather than collapsed—rubber because governments of producing countries saw no benefit to the price smoothing—and coffee because agreements lost consumer (and to some extent producer) support. The ICA for coffee was the only one that was successful in that it both raised and stabilized prices over the period of its activity, although Gilbert (2005) argued its success was based on "*a credible threat of a unilateral producer cartel, rather than the benevolent cooperation of the good of all as part of a new international order*."

Shaw (2007) contended that ICAs were intended to act as a form of insurance against losses arising from sudden large price fluctuations, averring: *"The fact that the conclusion of price-stabilizing commodity agreements proved so difficult in practice appeared to indicate that neither the exporters nor importers were prepared to pay a substantial premium for this kind of insurance."*

A number of ICA governing bodies, International Commodity Bodies (ICBs) still exist.[19] The FAO also hosts ten intergovernmental commodity groups. Burger et al. (2009) argue that although ICBs were originally created to manage international price stabilisation, these organisations still have a role to play in reducing transaction costs along commodity supply chains—primarily via publishing relevant statistics and studies, and undertaking projects — including some funded by the . Common Fund for Commodities (CFC), an example of which that deals with stockholding is mentioned in Box E in Section 3.1.

2.2 International Grains Council history: world wheat agreements and the doomed international grain reserve of 1978

The International Grains council (IGC) used to be just concerned with wheat when it was the International Wheat Council. Its origins go back to 1933 when four wheat exporting and eighteen importing countries came together, motivated largely by fears of glutted markets and slumping prices. From 1949 to 1969 a series of international wheat agreements tried to regulate quantity and prices amongst the members. Although the agreements never covered more than around two-thirds of world wheat trade, they apparently succeeded in that prices were stable and countries could get the wheat they needed. But they were sailing downwind: economic growth ensured that supplies

[19] Coffee (ICO); Cocoa (ICCO); Cereals, oilseeds (IGC); Sugar (ISO); Jute (IJSG); Rubber (IRSG); Bamboo, Rattan (INBAR); Tropical timber (ITTO); Cotton (ICAC); Olives, olive oil (IOOC)

could be sold; while heavy stocking by the US and Canada meant that extraordinary demands — from the USSR twice in the 1960s — could be accommodated.

Once the turbulent economic times that followed the commodity price boom of 1973/74 were encountered, the agreements broke down. But that price shock stimulated international interest in grain reserves. By 1978 UNCTAD convened a conference on an international grain reserve to discuss how stocks could be held nationally and their management internationally agreed. Talks, however, broke down over trigger price levels, stock levels and who was to contribute, and over special provisions for developing countries.

Following that the Wheat Council, now the IGC, has been mainly engaged in market reports, surveying policies, and providing a twice-yearly forum for members to meet and discuss issues of common concern.

2.3 Regional food reserves

Interest in regional reserves also increased after the last food price spike in 1973/74. FAO (1980) noted the establishment of **ASEAN's** Food Security Reserve (this was never operational) and also a proposal by **CILSS** (Inter-State Committee on Drought in the Sahel) to establish a regional reserve in the Sahel. FAO provided technical assistance to support these initiatives. The idea of creating a regional food reserve for **Mediterranean** countries was also put forward.

2.4 National reserves

Grain markets in most Asian and Sub Saharan African countries were under strict government regulation from independence to the late 1980s. China and India have since the 1960s kept substantial stocks well aware that by their size any entry on to the world markets to cover harvest shortfalls could push up prices substantially.

In Africa, the management of grain markets tended to be biased towards the urban population, because this was more politically active, and because the rural population was often assumed (however incorrectly) to be better placed to cope with food emergencies. Low consumer prices were maintained through maintaining low producer prices and heavy subsidies, and pan-territorial and pan-temporal pricing was the norm (Lynton-Evans, 1997).

Food Security Reserve stocks were established in several countries between 1975 and 1980, including Burkina Faso, Mali, Mozambique, Niger, Ethiopia, and Tanzania. However, the parastatals or government marketing boards which had monopoly rights for certain cereals were also responsible for managing reserve stocks—and this meant that when adequate funds to finance parastatal operations were not forthcoming, the reserve stocks were used in normal market operations. Again, insufficient resources meant reserve stocks were not replenished in subsequent years, and donor unwillingness to provide stock-rebuilding resources meant that quantities held in reserve decreased and eventually disappeared in most countries (Lynton-Evans, 1997).

After liberalisation of cereals markets during structural adjustment, there was a worry that liberalised markets driven by private sector traders would not be sufficient to cater to needs of the population. Governments again became interested in the establishing of strategic grain reserves (SGRs) to insure against failure of the private sector. Mechanisms for maintaining and operating a reserve under free market conditions were very different than under the conditions of heavily government controlled cereals markets. Their structure also needs to differ between countries to take into account specific circumstances such as cause or nature of food emergencies, coping

mechanisms available, and market structure.[20] They are designed to treat the transitory food insecure through specialist relief programmes such as food for work, rather than to supplement chronically food insecure. This latter problem needs a more holistic approach than can be provided by SGRs. (Ibid.)

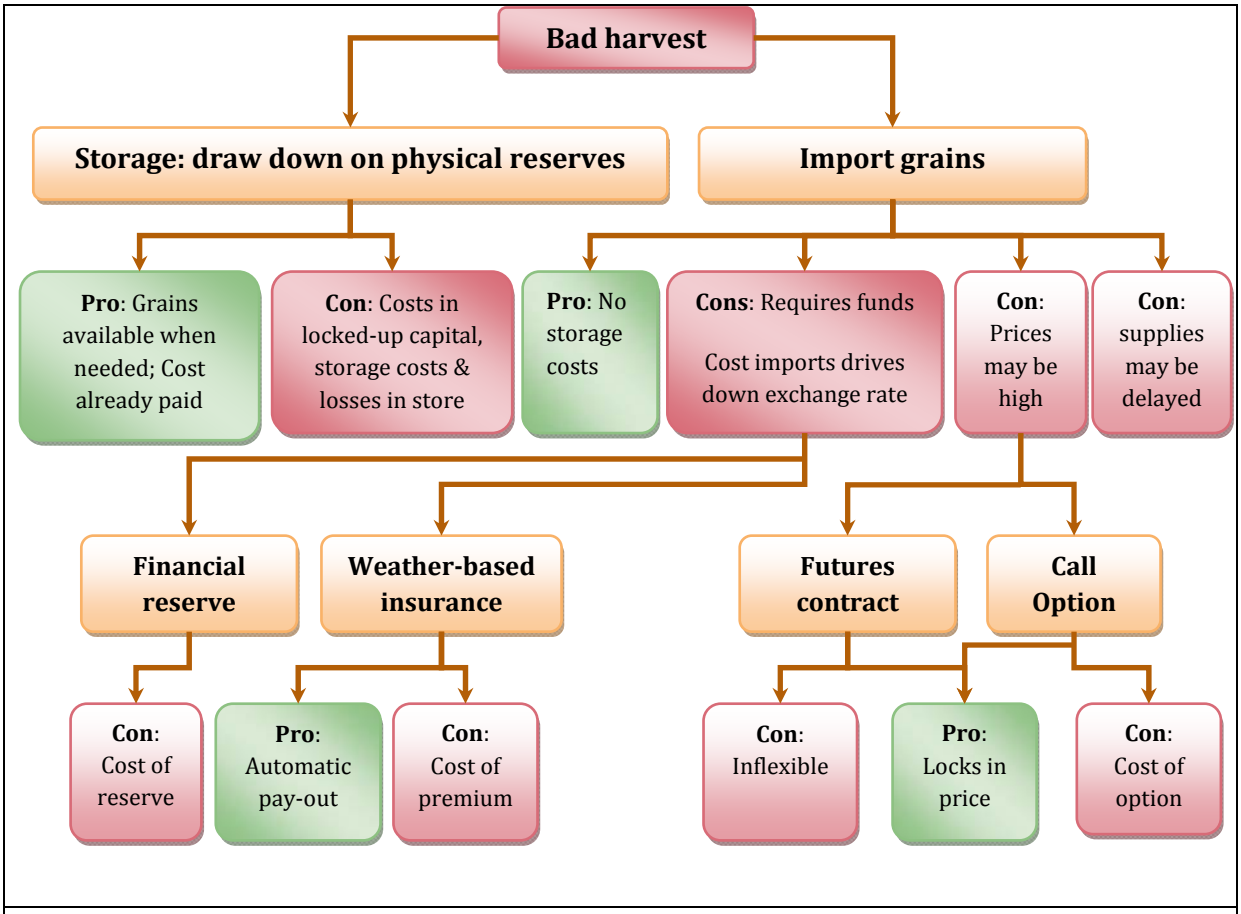
Box C sets out the specific dilemmas and options that apply to small, landlocked countries that face periodic harvest failures.

Box C: Stocks and the dilemmas of grain market management in Southern Africa

For inland countries of Southern Africa, the record shows that harvests fail badly a couple times every decade. Domestic costs of production of maize, the main food crop, are typically US$100 a tonne or less, but given the high cost of hauling maize from Indian Ocean ports to Blantyre, Harare or Lusaka, the cost of imports is rarely less than US$200 a tonne and often more. Hence in a bad year, the price of maize can double, imposing hardship on poor households.

The traditional response to this has been to hold considerable national reserves, often equivalent to three months supply or more. But this is expensive in tied-up capital, storage costs and losses in store — as much as US$44 to US$74 a tonne. Consequently governments were advised to hold only enough in reserve to cover the time taken to source imports from the world market and instead hold an interest-earning financial reserve to fund additional as and when needed. Other options include insuring the crop against bad weather, and using futures and call options on commodity exchanges — the main one for the region is Safex in Johannesburg — to hedge against price risks. The diagram below illustrates the choices facing governments.

[20] The record of SGR management has at times echoed the experience of 1980s food security reserves. Controversy surrounding high-level corruption in Malawi's SGR management in 2000/2001 damaged government-donor relations leading to the famine in 2002. Some donors insisted on hearing what had happened to 180,000 tonnes of supposedly stockpiled maize, while others argued that if the SGR maize had been exported within the same agricultural year (Devereux 2005 states the IMF recommended this strategy—indeed reduction in physical reserves in favour of financial ones was a policy advocated by many), US prohibitions on delivering emergency food aid would come into effect (Devereux, 2009). Massive mis-estimation of cassava production by Malawi's early warning system also contributed heavily (a national food surplus of 271,000 tonnes was projected pre-famine and later revised to a deficit of 435,000 tonnes after cassava production estimates were decreased over 56%) Ibid. This last point also highlights a potential pitfall of projecting national stock availability given error-prone estimates of production and consumption.



Source: SARPN, 2004, Scoping study towards DFIDSA's Regional Hunger and Vulnerability Programme

3 Current proposals on grains storage and price stabilisation

At least eleven proposals have been made in the last year or so in response to the 2007/08 food price spike. These can be classified as those involving storage, virtual and para-storage, information and co-ordination of storage, and trade facilitation — storage and trade to some extent are substitutes. Table 1 summarises the proposals and the discussion that follows.

Table 3.1: Current Proposals

Name	Problem addressed	Brief description	For	Against
Storage options				
Emergency reserve V Braun & Torero 2009, IFPRI	Short term need for WFP to have stocks for immediate distribution in case of need	300kt–500kt grain, kept at strategic points near food insecure areas Managed by WFP May fit under the Food Aid Convention to augment, or replace the barely functional International Emergency Food Reserve	Allows WFP to move swiftly when presented with unexpected needs Little or no impact on markets	Cost: at US$15 a tonne/yr to store, could be US$7.5M pa
Internationally co-ordinated public grain reserves Lin 2008, World Bank	'Avoid the excess price surges caused by hoarding and speculation' Justification rests on stock-to-use ratio	UN agreement that countries hold public stocks as percentage of annual use Mechanism to release such reserves to world market when world price exceeds a threshold	If discipline could be maintained, it could be effective: small additional amounts released could remove price spike	As public stocks rise, private storage falls Decisions on price thresholds, fraction to be stored are fraught with difficulty Commitment and discipline of countries: would they release stocks when prices are rising and domestic fears mount? Cost: if 70M tonnes additional in store, could cost US$15 a tonne/yr = US$1.05G pa
Regional and national reserves	To allow physical response to rising prices at regional or national levels	Build physical reserves to respond when harvests fail regionally or nationally	Tried and tested solution At national level, no problem of commitment and discipline	Costly: given that fluctuations nationally or regionally are greater than those internationally, such proposals must cost more than internationally co-ordinated stocks Temptation to use stocks for patronage. Creates uncertainty for private traders who now have to deal with policy risk on top of other risks
Virtual and para-storage options				
Virtual reserve V Braun & Torero 2009, Robles et al. 2009	To prevent speculators from driving up prices in futures markets and hence moderate spot market prices	Club of G8 + 5 + prominent grain exporters promise to provide funds when needed Global intelligence unit forecasts prices in medium and long run and sets price bands, advises… … High level technical commission that authorises short positions to be taken in futures markets when necessary to combat 'speculative attacks'	Intelligence unit generates additional information to the benefit of private trader	Not clear that rising futures prices push up spot market prices, so scheme may not be needed. Much depends on quality of global intelligence unit panel advising on operations, and on courage of technical commission to avoid political pressures and to take prompt action when indicated. Otherwise, scheme could run out of funds as private traders may run rings round the committee and profit at the expense of public funds. Cost: US$12–20G envisaged
Diversion from industrial and animal feed uses Wright 2009	Temporary lack of supply on food markets that leaves poor and vulnerable people facing hunger	Divert grain destined for industrial use such as ethanol or to animal feed to food markets Governments could buy call options from domestic biofuels producers or animal feeders to guarantee mutually advantageous diversion of grain to food use in specified crises. Similarly, governments could modify biofuel mandates to require diversion in crises	Feasible: similar schemes apply to water and electricity in USA Lower cost than storage	Cost of call options: perhaps a margin of US$100 a tonne needed Difference between value of grain in feed or industry versus food] for food to feed perhaps 100M persons — say 6m supply = 100kg a head, = 10M tonnes, so, total cost = US$1G. [Administration costs

Table 3.1, con'd

Name	Problem addressed	Brief description	For	Against
Information and co-ordination				
More and better information on storage Wright 2009	Market confidence	[Few details]	Relatively low cost	Difficulties of getting accurate reports on stocks: FAO not optimistic Is this all?
International food agency Wright 2008, Evans 2009	Temporary disruptions to supplies and fears of this	Scheme modelled on the International Energy Agency (IEA) *Reporting on stocks levels* Protocols for international collaboration should there be disruption to imports	Low cost Flexible to circumstances	Difficulties of getting accurate reports on stocks: FAO not optimistic Commitment and discipline of countries
Trade facilitation				
International grain clearing arrangement Sarris 2009	To reduce risks in grain trading when supplies are tight	International clearing house guarantees contracts for grain deliveries, to reduce or remove risk that when supplies are tight exporters renege on contracts Good faith margins posted with the clearing house that invests in physical reserves or futures markets	Low public cost Encourages investment in stocks	How large would the margins have to be? Would users be prepared to invest in them? Would the system work at times of global tight supply?
Prevent export bans Wright 2009, Lin 2008	Temporary disruption of supplies on world markets	Exporting countries pledge not to apply export bans or prohibitive taxes for exports under any situation. Probably under WTO rules	No cost Straightforward	Getting agreement and commitment, discipline
Food import financing facility Sarris 2009	To allow low income countries to buy import when price rises drive up costs	Similar to the IMF's Food Import Financing Facility, would provide access to finance when cost of staple imports rises substantially	Meets a need Straightforward	Cost of funds may be too high for some countries. If funds highly concessional, costs rise; strict rules needed to target funds to needy countries Scheme may be administratively complex deterring the poorest countries from using it [Similar problems to lack of use of the IMF's FFF]
Others				
Production reserves Sarris 2009	To increase supply of food when prices rise	Allow land that has been set aside in OECD countries to regulate production or for environmental purposes to be put into production in the short term	No public cost	Keeping productive land out of production depresses supply and thus tends to push up prices From the time permissions are granted to harvest takes at least 6 months when probably increased output will be pro-cyclical rather than stabilising Just how much arable land is still held in reserve in OECD countries?

3.1 Storage options

An emergency reserve for food aid

The International Food Policy Research Institute (IFPRI) has proposed a physical reserve emergency reserve of about 300,000 to 500,000 tonnes of grain, decentralized and located at strategic points in or near developing country regions. The WFP would manage this reserve and use it solely for humanitarian and emergency response. To cover the cost of restoring the grain, an emergency fund accompanied by a financing facility would be attached to this. (von Braun & Torero 2009)

Such an arrangement could also be defined under a newly designed **Food Aid Convention (FAC)**[21]. Calls to reform the FAC have been on IFPRI's agenda before (see for example Hoddinott and Cohen, 2007 & von Braun et al, 2008). This part of the proposal is related to the **International Emergency Food Reserve** (IEFR) portion of the FAC. The IEFR was established in the wake of the 1973/74 food price spike, but has fallen short of expectations—see Box D for a précis of its experience to date.

This reserve would allow WFP to respond quickly to any unexpected needs. Given its size it would make little or no impact on markets. The main obstacle to this is the cost. If 500k tonnes had to be stored, at US$15 a tonne this would cost US$7.5M a year.

Box D: International Emergency Food Reserve in perspective

In **1973**, Lack of resources meant the WFP experienced a shortfall of 160 thousand tonnes, despite the fact they took on no new projects *and* cut quantity of rations and number of recipients targeted. In **1974**, Saudi Arabia offered WFP a donation of 50 million US dollars[22], by some interpretations indicative in a shift from the view of food aid as surplus disposal towards its ideal. The IEFR was established in **1975**, designed to facilitate quick WFP response to emergencies. It receives contributions from all governments and has a minimum **annual** target of **500,000** tonnes. **Donors** are expected to announce contributions one year in advance *in addition to pledges for WFP's core resources*, to ensure they are shipped in a timely manner and to absorb costs of transport. **Developing** countries not in a position to contribute financially to the IEFR can participate through the provision of interest-free loans of commodities to WFP in early stages of emergencies. In **1980**, many UN member states supported a proposal from FAO that the IEFR be developed into a **legally binding** convention in order to ensure predictability, continuity, and availability without diverting WFP resources from the development projects in which it was then more heavily involved. There was also a move to increase the IEFR target to 2 million tonnes. Neither of these proposals came to anything. Shaw (2007) suggested that a provision in the proposals to allow FAO to modify existing procedures 'at a later stage in the light of experience' and donor reluctance to give FAO authority over such decisions contributed to the failure of the proposals.

In **1989**, operational changes in WFP channelled a sub-set of their regular resources towards refugees and IDPs, which reduced pressure on the IEFR. In **1991**, WFP set up the *Immediate Response Account* (IRA) within the IEFR; a USD 30 million cash fund to purchase food commodities close to sources of emergency need. In **2008** the IRA received approximately USD

[21] The 100th session of the Food Aid Convention came and went June 2009. The 1999 FAC was extended until June 30 2010 and the FAC is set to meet again in December to decide objectives and structure of a new FAC. Ireland's Sharon Murphy was unanimously selected the new year's Chairperson, commencing July 1. Ireland's food aid donations have exceeded the level they committed to in original negotiations and their national position has been delivery of emergency, cash only and untied food aid. Re-negotiation of the FAC into a Food Assistance Convention will allow members to support a move to provide binding commitments (DAFF, 2009)

[22] This was the largest cash donation ever made at the time, doubly striking because it came from a non-industrial net food importer. In May 2008 (just beyond the peaks of international wheat and rice prices, and while maize prices were still going up), Saudi Arabia again broke the record by donating USD **500 million** to WFP (http://www.wfp.org/news/news-release/wfp-completes-755-million-appeal-saudi-pledge).

39 million, which in wheat equivalent translated to just over **100,000** tonnes (IGC, 2009).

Nonetheless, a lack of donor accountability strongly shapes the IEFR experience, as with the wider FAC.

- It has turned out to be neither a financial nor a physical reserve, but rather a "**voluntary facility**" for donors to provide emergency relief in the form of either food stocks or funds **kept in their own countries**.
- Contributions to the IEFR may **bypass the WFP**, which means the facility is not fully multilateral.
- IEFR modalities approved by donors have not been respected in that A) Contributions have not always been announced in advance; B) Many contributions have been tied to particular commodities and emergencies, reducing flexibility of WFP response; C) Contributions have fluctuated considerably; D) Cash contributions have fallen short of requirements; E) No increase in minimum requirements since IEFR establishment, means per capita contributions have gone through the floor.

The upshot is that timely and proportional response to all emergencies, particularly those with less media exposure, has been compromised. As Shaw notes:

> "*Therefore, the world still does not have an adequate international emergency food reserve. A truly multilateral and fully subscribed emergency reserve would help to take the politics out of emergency aid, avoid the hardship and suffering that afflicted populations might needlessly endure, and limit the costs and diversion of funds for development that result from a late and inadequate response to emergencies.*"

Sources: FAO, 1980; Shaw, 2007; IGC, 2009

Internationally co-ordinated public grain stocks

If one of the main causes of the food price spike was the low ratio of stocks to use, as Wright (2009) argues, then increasing physical stocks becomes a priority. The Chief Economist of the World Bank has thus proposed that there be a UN agreement internationally where countries would hold public stocks in addition to any private storage as a percentage of annual use. These stocks would then be released onto the world market when a price spike was forming. (Lin 2008)

Clearly-focused, this sounds feasible so long as international agreement and discipline are forthcoming. These, however are important reservations. It could be difficult to get agreement on the fraction of grain use to be stored and at what threshold to release stocks. Moreover, would countries really commit to release their public stocks to the world market if prices were rising and domestic interests appeared threatened? If public stocks are increased, it may well be that private traders will reduce theirs, so that to achieve a net increase in stocks may require much larger stocks than envisaged.

The cost of this proposal looks substantial. If the two years running up to the price spike saw global grains use exceed supplies by around 70M tonnes (FAO Outlook data) and it costs US$15 a tonne[23] to store cereals, then to store this amount would require US$1.05 billion a year.

[23] This figure reflects US storage costs. In December 2005 Iowa State University calculated that it cost around US$0.42 a year to store a bushel of maize, including storage costs, wastage in store, and the capital tied up in inventory. Wheat may cost a little less. These costs are far less than those estimated for inland Southern Africa in Box C, reflecting higher technical efficiencies in the Mid-West and lower costs of capital, amongst other things.

Regional and national reserves

The recent price spike kindled (and re-kindled) interest at the regional level for collaboration on measures to improve food security regionally, particularly in vulnerable areas. Examples include:

- **The Southern African Development Community (SADC)**. In response to the 2007/08 price spike it has revived plans, last discussed in the aftermath of the food crisis that began in 2002, to launch a strategic grain reserve for Southern African countries. Various models are being proposed and negotiated, including a reserve of 500,000 tonnes run by a board, as well as a cash component for countries that do not have any surplus to contribute. The food/cash balance will be about 75%/25%, and the reserve is proposed to include a combination of cereals housed across several countries in the region to facilitate access. Officials hoped the facility would be operational by mid 2009 (Viatte et al., 2009). This has not transpired.
- **The Association of Southeast Asian Nations (ASEAN)** has renewed its plan to establish an emergency rice reserve, originally under the ASEAN Food Security Reserve Agreement (AFSR) of 1979. This agreement has never been operational.
- **Latin American Food Sovereignty**. Bolivia, Cuba, Nicaragua and Venezuela have agreed to create a USS100M fund to finance multilateral cooperation on food sovereignty which will involve some building of grain or food reserves (Viatte et al, 2009).
- **South Asian Association for Regional Cooperation (SAARC)** created a Food Security Reserve in November 1987. Each member was entitled to draw on foodgrain reserves in an emergency, however price and other repayment conditions were not specified beforehand, but were rather to be "the subject of direct negotiations between the member countries concerned". Steps to modify this system began at a SAARC summit in 2004. A formal document was endorsed by SAARC in 2006, scheduled to be ratified in July 2007. Only 4 member countries ratified this by July 2008, and the SAARC Regional Food Bank was still not in place at the end of 2008 (Dorosh, 2009).

Figures III.1 and III.2 in Annex III show the historical level of maize, rice, and wheat stocks held by these regional groups; and their stock-to-use ratios, respectively.

At national level, the 2007/08 spike ushered a noticeable loss of confidence in markets.[24] Many countries are now focussing on national production and storage as a means to improve the access of their populations to basic staple foods. Release of stock at subsidized prices was a popular policy response to the food price spike[25], and many countries were even stock-building mid-crisis. In several instances countries have declared their intention to pursue strategies to achieve self-sufficiency — for example, Armenia (wheat), Brazil, Burkina Faso, China Malaysia, Mongolia, Nigeria (rice, cassava, wheat, tomatoes, cotton, livestock, and fisheries), Indonesia, the Philippines, and Senegal (FAO, 2009; Viatte et al, 2009; Demeke et al, 2009).

[24] Countries that instituted export bans or restrictions include: Bangladesh, Cambodia, China, India, Iran, Jordan, Kazakhstan, Lebanon, Myanmar, Nepal, Pakistan, Syria, Vietnam, Cameroon, Egypt, Ethiopia, Guinea, Kenya, Malawi, Tanzania, Zambia, Argentina, Bolivia, Brazil, Ecuador.

[25] Countries that released stock at subsidised prices include: Bangladesh, Cambodia, China, India, Iraq, Jordan, Lebanon, Malaysia, Nepal, Pakistan, Philippines, Republic of Korea, Thailand, Viet Nam, Yemen, Algeria, Benin, Cameroon, Egypt, Eritrea, Ethiopia, Kenya, Malawi, Mauritania, Nigeria, Senegal, Sierra Leone, Togo, Bolivia, Brazil, Costa Rica, Dominican Republic, Guatemala, Guyana, Honduras.

In a survey of proposals mentioned by recent inter-agency-assessments, Viatte et al (2009) noted growing interest in grain reserves at local and national levels, citing Burkina Faso, Comoros, Congo DR, Madagascar, Malawi, Nicaragua, Pakistan and Zambia as countries with proposals to strengthen existing grain reserves or to introduce them. These proposals vary widely; for example, Zambia's Food Reserve Agency plans to establish a national strategic food reserve by 2010. They have an act that includes establishing an agricultural marketing council, providing improved market information, and encouraging private agricultural investors to use public storage. The Congo DR aims to establish strategic stocks at provincial offices. Comoros plans a 6 month strategic reserve of rice, milk powder, oil, and canned fish. Bangladesh, Sri Lanka, Nepal and the Philippines already traditionally maintain public grain stocks for purposes of price stabilisation.

Some countries have also emphasised holding reserves in villages and communities. Viatte et al. (2009) cite specific examples of Burkina Faso, Burundi, and the Gambia which have focussed on village-level grain reserves. Burkina Faso, a landlocked country with only one rainy season, has a history of promoting community grain banks that have become popular throughout the country. NGOs such as Oxfam have also worked for many years in promoting village-level grain banks. Such banks essentially function by purchasing grain at the end of harvest when prices are low, and selling at the hungry season when prices are traditionally high, for a mid-range price that is more affordable. Profits are used to restock in subsequent years. Village grain banks can, however, be exhausted by serious harvest failures and at that point, for lack of capital to re-establish them, they collapse.

A more sophisticated and potentially more effective way to store grains is through formally-managed regional and district level stores that offer warehouse receipts to farmers and traders lodging grains in store — see Box E.

Box E Warehouse inventory credit programmes

Warehouse receipts offer farmers and traders the opportunity to store grains for a fee in silos with low wastage. Depositors receive a receipt that is a tradable instrument that could, for example, be used as collateral in a loan or as a guarantee to suppliers of seed and fertiliser providing goods on credit.

Warehouse receipt systems could thus have a key role to play in the development of agricultural markets—via: 1) providing a source of collateral; 2) facilitating access to credit warehouse receipts to develop standard weights, measures, and grading systems; 3) increasing awareness of quality issues; 4) moderating seasonal price variability; and 5) encouraging development of futures and derivative markets to manage risk (World Bank, 2005). Such schemes operate best in countries with trusted warehouse operators, strong regulatory and supervisory capacity, and minimal state intervention in markets.

A challenge for such schemes is that they tend to exclude small-scale farmers due to the high administrative costs of processing low volumes. There have however been attempts to target inventory credit to small-scale farmers, particularly for grain marketing. A pioneering project was set up for maize farmers in Ghana in 1989. Farmers involved in the **Ghana Inventory Credit Project** formed groups of 20 to 50 members to participate. Loans were given to groups which were responsible for individually disbursing them, and warehoused grains became the collective property of the group, jointly responsible for treatment, storage, and sale, as well as for tracking each individual farmer's account. By the late 1990s, the scheme was benefiting more than 100 farmer groups, and loan repayment was at nearly 100%. The programme's success led the Agricultural Development Bank of Ghana to promote large-scale commercial inventory credit schemes, which ushered in dramatic reductions in inter-seasonal price fluctuations—benefiting small-scale farmers still selling immediately post harvest (Ibid).

Inventory credit programmes are especially valuable when seasonal fluctuations are high. Recently, the Intergovernmental Group on Grains (an ICB mentioned at the end of section 2.1) set up a similar project for **Ethiopia** and **Tanzania**, financed through the **Common Fund for Commodities**.
Sources: World Bank, 2005; CFC website: http://www.common-fund.org/

While these regional and national proposals all respond to fears of higher prices and restricted supplies of food, their aims range from having stocks for emergency distribution, to price stabilisation, to sovereignty fears over food supplies.

Most have the advantage that they potentially could work: holding stocks and releasing them is straightforward. Release of stocks was a common strategy taken by countries responding to the rising world prices in 2008.[26] On the downside, for the regional reserves there is a substantial problem in getting commitment and discipline to a set of rules, and on deciding how much different countries contribute. For example, in SADC, would a country facing a harvest failure with rising domestic food prices allow regional food reserves held within its territory to be shipped to a neighbouring country where there was a worse harvest and even higher prices? The national counterpart of this is the willingness of governments to respect food reserves for the purposes for which they were created. National food stocks created, for example, for disasters may be used for price stabilisation, or even for distribution to political supporters.

Cost is another major drawback: since fluctuations in supply and food prices tend to be greater the smaller the geographical unit, the percentage of production that needs to be stored to achieve aims of price stabilisation, for example, rises with geographical disaggregation. Hence regional and national reserves are likely to be more expensive than internationally co-ordinated global reserves in achieving goals of stabilising prices and supplies.

3.2 Virtual and para-storage options

Virtual reserves on futures markets

Von Braun and Torero (2009) defined the main role of the **virtual reserve** as one of minimizing speculation in food commodity markets to prevent price spikes, and forestall harmful trade interventions.

The mechanism consists of four major components: first a *club of countries* committed to supplying funds; second a *fund* (not actual but promissory[27]) to be used in the event of intervention becoming necessary; third, a *Global Intelligence Unit*[28] responsible for forecasting prices in medium to long term, designing and maintaining price bands based on such forecast models, and finally, triggering interventions when prices move significantly outside this band; and fourth, a *High Level Technical Commission* with full autonomy to decide whether or not to approve sales in a futures market.

[26] See Annex II for more detail on stockholding levels in countries that released stocks in response to the spike.
[27] This seems to omit the need for posting margins, the costs of which could mount rapidly in a futures market where prices are rising, if they are to maintain their positions.
[28] Housed in an institution with price forecasting modelling capacity and drawing on analytical capacity of "specialized organizations (such as FAO, the U.S. Department of Agriculture, IFPRI, and the World Grain Council)"

The proposal has the merits that the intelligence unit would generate additional information of use to all market participants. Otherwise, there are many and substantial objections to this proposal, including:

- The proposal rests on the hypothesis that speculation in futures markets affects spot market prices. There is not much evidence to prove this. IFPRI themselves have tried (Robles et al. 2009), and their results show that most of their proxies for speculation do not affect spot prices. By using a battery of estimates they find some significant relations amongst four price series and six proxies, but there are so many cases where the results are insignificant, that they hardly prove their case. Other commentators are scathing about the relationship, see for example Irwin (2009) cited in Box E. If speculation does not contribute substantially to price spikes the proposal is, of course, invalid;
- The scheme has been assessed as costing, when needed, between US12 and US$20 billions — enormous sums by any measure. If these funds were just capital to play the markets, then perhaps the real cost is the opportunity cost of the funds tied up, but there are reasons to worry, as follow;
- Price stabilisation schemes such as buffer stocks appear on paper to be self-funding since stocks are bought up when prices are low and released when high. But the dismal history of these shows that they usually, and sooner rather than later, run out of capital — apparently since, contrary to intuition, prices do not settle towards the middle of the price bands set (Wright 2009). Might this scheme fall prey to the same processes? It might since…
- The scheme sets a technical unit that reports to a commission that has to approve market operations against experienced traders who can act in minutes according to their judgment. This is surely a mismatch. The traders should be able to run rings round the commission and make money in the process, at public expense. In a nightmare scenario, the US$12 billions are lost to smart traders able to make quicker and more agile decisions than the commission. Almost as bad, traders would no doubt spend time that should be focussed on market fundamentals second-guessing the commission. It thus introduces yet more uncertainty into the market, not less. Much clearly depends on the quality of the intelligence unit and the alacrity and courage of the technical commission. The history of international buffer stocks, professionally managed, does not inspire confidence.

Box E: Role of Speculation

The importance of speculation in triggering a food price spike underlies the IFPRI proposal.

While it is difficult or perhaps impossible to prove conclusively whether speculation played a significant role or otherwise in the 2007/08 price spike, some of the analyses to date invite doubt.

Robles et al (2009) from IFPRI statistically tested if speculative activity in the futures market could be identified as a source of increasing agricultural commodity prices in 2007/08. They found that "speculative activities might have been influential, but the evidence is far from conclusive."

Irwin (2008) takes a very sceptical view, seeing the arguments of price bubble proponents as conceptually flawed and reflecting fundamental misunderstanding of how commodity markets work. The statistical evidence does not show that positions for any group in commodity futures markets consistently lead futures price changes. Perhaps most important of all, if speculation

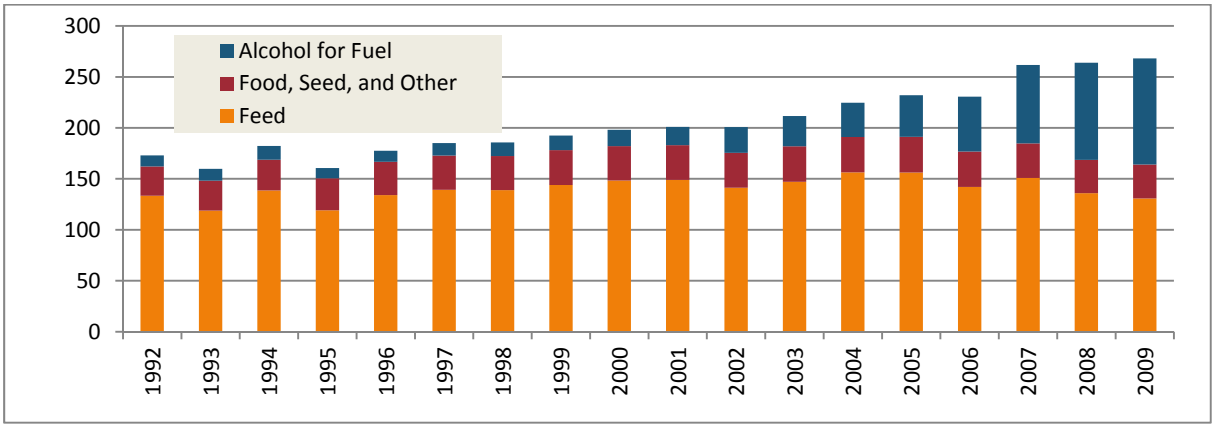
were to affect spot market prices, then supplies would have to be held off the market physically. Where are these stocks, he asks? Stocks are low, not high. Finally, he notes the historical pattern of (unfounded) attacks on speculation when markets are volatile.[29]

Of the three main cereals, rice is the one where there is little activity on futures markets. Yet the price was far greater for this crop than for maize or wheat. Commenting on this, Timmer (2009) argues that the rice spike was instead mostly driven by hoarding by small traders and consumers—"a 'rational' behavioural response by millions of individuals to the actions of panicky governments and the consequent impact on prices".

Diverting cereals from animal feed and industrial use

Increasingly grain is produced not for food, but for animal feed and industrial use. Figure 3.1 below shows US maize consumption from 1992 to 2009, where the last two years are projections.[30] The dramatic increase in maize use for biofuel is evident from the early years of the current decade.

Figure 3.1: Maize consumption in the US by type of use, million tonnes



Source: Constructed using data from USDA ERS

If an ever large fraction of cereals goes either to feeding livestock or producing biofuel, then this creates what amounts to a reserve, since in times of rising prices, livestock feeding and ethanol production could be scaled back to allow more supplies to the food market.

At the June 2009 World Grain Forum in St Petersburg, Wright (2009) looked at diversion of grain from industrial and feed use to food at times when price spikes are forming as a way to prevent poor and vulnerable people going hungry during food price spikes. He proposed that governments buy call options from domestic producers of feed or fuel crops that can be switched to human consumption in the event of specified crises. Similarly government biofuel mandates could be suspended or even revised to require diversion in crises.

[29] Ironically this may be one good reason to intervene in futures markets. Politicians loathe not taking action when there is public consternation. When the Indian minister concerned was asked why the cereals futures market in Delhi was suspended in 2008, he reportedly replied to the effect that while he did not know if this would do any good, he had to be seen to act! More recently, the Permanent Subcommittee on Investigations for the US Senate (US Senate, June 2009) reported finding "significant and persuasive evidence" that speculation played a role in the recent spike. They recommended the Commodity Futures Trading Commission phase out "exemption and waivers that allow some index traders to operate outside of the trading limits designed to prevent excessive speculation." Irwin et al. (July 2009) issued a rebuttal and criticism of the Subcommittee analysis.

[30] Table IV.1 in Annex IV shows maize, rice, and wheat uses for feed, food and processing, and seeds and other uses for selected regions in 1992 and 2002.

The operation would be similar to that used for other key goods, such as water where irrigation is suspended to guarantee urban water supplies during droughts, and electricity where non-essential uses are interrupted when blackouts are imminent.

The proposal has the merits of appearing feasible, the costs are probably lower than those of storage, and the intervention in the market is temporary.

On the other hand, it presupposes that maize, and other grains, for feed, fuel, and food are substitutes. A key informant in the biofuel industry was sceptical since grain diverted from an ethanol distillery would not be food quality, but could perhaps be used as feed. Similar technical issues arise with farm equipment to switch between harvesting premature whole crop maize broken for silage to harvesting mature maize ears; and the infrastructure for storing dry grain as well as silage which is stored anaerobically.[31]

There is also the cost of this. Whatever the modality, feed millers and ethanol operators would expect to get compensation for switching supplies. This could be of the order of US$100 a tonne during an emerging price spike: the difference between the market value and that at which poor people could access grain. If, say, 100M additional persons were at risk of hunger — roughly the number indicated by Ivanic & Martin (2008) from modelling, and they were to be offered the chance to obtain 6 months supplies, around 100 kg grain, at prior prices, then the cost becomes US$1 billion.

Finally there are administrative costs of moving cereals to vulnerable people and offering them cheaper grain, plus costs of identifying the target group. This could be a major exercise, only avoided in those countries, such as India, where there are existing systems that allow the poor access to subsidised food. For this reason, this proposal may not have widespread application, but in those cases where governments or other agencies are committed to supplying food to vulnerable people, this may provide cheaper ways of obtaining supplies when food spikes threaten.

3.2 Information and co-ordination of stock management

More and better information on food stocks

Wright (2009) argued that confidence in markets could be increased were there more and better information on stocks. In the literature seen, however, there is no further detail on just how this might be done.

FAO is not optimistic that better information can be generated without considerable extra effort and cost —partly since there are so many stock holders, and partly since some grain market participants

[31] There's also a public relations conundrum here: that there would be no resistance to motions to divert cow food, chicken food, or even less nutritionally valuable ethanol feedstock to food—i.e. that it would not be undesirable as when C Drummond of New Zealand offered to send dog food as aid to Africa in 2006, see BBC report here: http://news.bbc.co.uk/1/hi/world/africa/4664884.stm. That aside, much of the US yellow maize distributed by the WFP is feed grain (an inferior good), used partly to encourage self-targeting by the hungriest.

would see their stocks as commercial secrets.[32] This may be unduly pessimistic: obliging those operating storage of significant scale to report holdings at a few critical times in the year does not sound onerous, especially when stores are independent enterprises storing grain held by various parties so that the reporting requirement would not require the owners to be identified. Given that some countries are able to collect such data, the obstacles cannot be so great if the will were there.

The great advantage is that it is difficult to imagine that the costs of collecting information are more than a small fraction of storing physical products.

International Agency for Food

With the International Energy Agency in mind, a similar scheme has been proposed by Wright (2008) and Evans (2009). The IEA, which was established in 1974 in the wake of that commodities spike, reports on public and private petroleum stocks in OECD member states, and has developed protocols for international collaboration in assuring supplies reach a member country should there be a disruption to their import market. Wright suggested that cereal importers should study this model seriously. He also suggested accuracy and timeliness of reporting stocks should be improved to minimize uncertainty about state of supplies.

Viability of any IEA-for-food proposal rests strongly on this last point; without an accurate knowledge of who holds what stock at a precise time, it is difficult to imagine how protocols for emergency response could be practically agreed, let alone implemented. The IEA performs monthly checks to ensure members have minimum emergency oil reserves of 90 days of net imports. OECD net food importers have more fiscal space to manoeuvre when it comes to stockholding and monitoring than the low income net food importing developing countries which would arguably stand to benefit most from an IEA designed for food.

Another key feature characterising the IEA that serves to highlight importance of data on stockholding is that although rising prices may cause supply shortages, they are not a trigger for IEA collective action; the objective of which is reaction to actual physical shortage rather than price movements.

Furthermore, although there have been 7 major oil supply disruptions since the late 1970s, the IEA implemented collective action in response to only two; Hurricane Katrina in 2005, and the Iraqi invasion of Kuwait in the early 1990s. Supply losses from all disruptions—outbreak of war in Iraq (2003), Venezuelan strike (2002/03), Iraqi oil export suspension (2001), Iraqi invasion of Kuwait (1990/91) and the outbreak of the Iran-Iraq war (1980/81)—were greater shocks (measured in peak supply loss, by 153, 173, 140, 287, 263, and 373 percent respectively) than the supply disruption caused by Hurricane Katrina (IEA, 2008). These lack of responses emphasise the differences in

[32] FAO released a draft "Global Strategy to Improve Agricultural Statistics" in June, with a 3-point vision as follows:

- Countries agree on a minimum set of core data to meet emerging demands & pledge to provide this data annually;
- Agriculture will be integrated into national statistical systems—to meet the expectations of policy makers and other data users. Data will be comparable across countries and over time; and,
- Integration will be achieved by development of a "Master Sample Frame for Agriculture", implementation of an "Integrated Survey Framework" , with results available in an "Integrated Data Base" (FAO, June 2009)

demand for petroleum and staple food products; although both are fairly inelastic, petroleum consumption can be rationed to a greater degree.

This proposal has the merits of being low cost and flexible, adjusting to circumstances. But much depends on getting the information on stocks. In addition, getting the commitment and discipline on releasing stocks would run into the same problems that beset any scheme where nationally-held stocks are expected to have international functions.

As an aside, this proposal is odd in that the world already has a mandated food agency, FAO.

3.4 Trade facilitation

International Grain Clearing Arrangement

At the World Grain Forum in St Petersburg in early June Alexander Sarris of FAO proposed an International Grain Clearing Arrangement (IGCA) to reduce fears that contracted supplies would not be released under conditions seen recently of tight supply and soaring prices. It would guarantee grain trade contracts (between countries or private entities) in the medium and long-term. It would be housed in an existing institution such as an international bank or multilateral financial institution, and would function as a holding body for a "good faith margin" contributed by the buyer and the seller in any particular contract. These amounts posted as margins could be borrowed from international banks or other multilateral financial institutions.

To guarantee availability of physical supplies, the IGCA would invest its financial reserves in physical stocks of grain in locations of excess supply, or in the form of futures contracts in organized commodity exchanges. Any commitments in futures taken out as insurance on a particular contract could be liquidated upon execution (physical delivery between buyers and sellers) of said contract.

This proposal looks to have low public costs and would encourage investment in stocks. Since this is an untested arrangement it is not clear how trading entities would want to use this facility. A grain trader reported that they already had ways to insure against contract default. There are also questions about how large the margins would have to be so that the clearing house could cover for any reneged contracts. The danger is that the margins could become onerous when market prices diverge from contracted prices.

The proposed IGCA looks somewhat similar to the **International Commodity Clearing House** (ICCH) proposed in 1949. At the time the world food situation was characterised by commodity surpluses in areas with strong currencies (particularly the US dollar), while countries with weaker currencies and insufficient supplies could not afford imports. This led to the ICCH proposal; a public corporation with US$5 billion, to be housed in the FAO. Its proposed remit covered the following half dozen main functions:

1. Purchase surplus commodity stocks and hold these to protect consumer interests during times of shortage
2. Coordinate negotiation of bi- or multi-lateral trade agreements
3. Negotiate sales in weak currencies to assist trade flows during periods of exchange disequilibrium
4. Negotiate sales at special prices to countries in special circumstances (for relief programmes, nutritional programmes, or development projects)
5. Co-ordinate negotiations on ICAs

6. Organise consultations between governments and institutions regarding commodity policies and arrangements, uses of land and other resources to supply changing world demand. (Shaw, 2007)[33]

This wider and more ambitious ICCH proposal was rejected at the time by FAO member nations, apparently because developed countries, and the US and UK in particular, were reluctant to yield power to multilateral institutions. (Shaw 2007)

Outlaw export bans and restrictions

Since several analyses have concluded that the export bans, and particularly those on rice, played an important part in generating the price spike, it is not surprising that preventing such restrictions has been proposed more than once — see, for example, Lin 2008, Wright 2009. Practically, this would involve modifications to WTO rules — even if some important grain exporters, such as Kazakhstan, Russia and the Ukraine, are not members of WTO.

The proposal addresses major concern and would cost little to implement. The problems arise in getting agreement on this. Although export restrictions form part of the remit of the WTO, existing rules impose few constraints on members.

Food Import Financing Facility

Sarris (2009) argues for a facility to help low income countries facing sudden increases in their food import bills to meet the additional expense. The suggestion of commodity reserves and food import financing was also proposed by von Braun *et al*. (2008).

Neither idea is new, particularly the Food Import Financing Facility, which exists in the IMF since 1981, see Box F, even if little used.

The proposal looks to meet a need and should be straightforward. But the question arises of why this should be needed rather than making the IMF facility more usable. Concerns include administrative complexity; and costs, terms and conditions of such lending. If funds are cheap, then rationing becomes a problem, and if too expensive, then the facility would not work.

The apparent difference to the existing IMF window is that the proposed facility would lend before the event, on the basis of estimated market conditions and would lend to financial entities to finance trade, rather than to governments.

Box F: IMF Food Financing Facility

In **1979**, world cereal production was down, particularly in some developing countries, export **prices** and **freight rates** were on the rise, and the need for an **IMF Food Financing Facility** was clear. The proposal was posited on the argument that all countries should avoid decreases in consumption during a food crisis, via 1) drawing on existing reserves; 2) increasing commercial imports; or 3) obtaining additional aid. Limitations on the first two options for

[33] The first two functions are shared by the proposed ICGA; the third with the FIFF. The fourth became partially absorbed by the WFP which was created in 1960. The need for the fifth has come and gone, as discussed in section 2.1. The final function is also related to the ICGA, though it covers a broader remit.

impoverished countries naturally led to a focus on the third.

The IMF established a Food Financing Facility, designed to address short-term balance of payment deficit in the event of crop failures or world price spikes, in **May of 1981**. It exists under the **Compensatory Financing Facility** (CFF) which covers two types of shock; *temporary export shortfalls* and *cereal import excesses*. Why then has the latest food crisis brought calls for its **establishment** from UN and CGIAR agencies?

In 1985, Kirkpatrick criticized the FFF because "limited use" had been made of the facility, and the FAO Director-General had called for it to be improved. Although the repayment terms for drawing on the FFF were supposed to take into consideration subscribing countries' existing debt burden and financial prospects, the facility was used much less than anticipated. According to Shaw (2007), "terms for accessing the facility were set too high to make it attractive or acceptable". Where countries have existing balance of payment weaknesses, they cannot access the CFF without a parallel fund-supported adjustment programme. Indeed, the CFF has not been used for the last 10 years, and was obviously not used during the food crisis of 2007/08. The strategy for developing an independent Food Import Financing Facility without IMF attached conditionalities was elaborated by FAO and UNCTAD as part of the Marrakesh Decision during the Uruguay Round, and was on the agenda at the Doha Ministerial in Nov 2001.

In a recent press release modestly titled *IMF implements major lending policy improvements* the IMF made two statements pertinent to a FIFF:

> "***Reform of facilities for low-income country members***. In addition to the reform of structural conditionality, which applies also to concessional loan facilities available for low-income countries, the Fund is considering modifications to its concessional lending facilities to strengthen the IMF's lending tools for providing short-term and emergency financing to low income countries.
>
> ***Simplifying lending toolkit***. Some facilities that have not been recently used (Supplemental Reserve Facility and the Compensatory Financing Facility) are being eliminated."

Sources: IMF March 2009; Forbes 2006; Shaw 2007; Kirkpatrick 1985; ActionAid, 2004

A final proposal linked to some of the other proposals is that of ***production reserves for food*** (Sarris 2009). The idea behind a production reserve is related to set-aside policies in several OECD countries. In high income countries, productive land that has been set aside can be producing within six to ten months—as evidenced by the recent supply response to soaring prices in 2007/08.

The disadvantage is that production reserves constitute a lagged response that does not deal with the immediate problem and indeed, could be pro-cyclical in that supplies come on to the market when farmers are responding to higher prices in any case. Moreover, anything that encourages land to be taken out of production is likely, all other things being equal, to raise the cost of food production.

4. Conclusions

Less is known about cereals stocks than is optimal, but without some drastic measures — yes, grain traders, transporters, processors, farmers, and consumers could be legally obliged to file periodic reports on the grains they hold and a substantial bureaucracy created to ensure compliance — it is unlikely that more will be known.

Stock-to-use ratios have varied through time and when they fall to low points, price spikes often form. This is partly since stocks to a large extent reflect production and consumption in recent years, so that falling ratios indicate movements in supply and demand likely to raise prices; and partly since

once stocks fall to a level where more cannot be released, then market adjustments to short term supply or demand shocks takes place entirely through price movements. Most analysts see reduced stocks as a fundamental cause of the 2007/08 cereals price spike.

The history of trying to stabilise prices and to co-ordinate demand and supply for commodities in general and food in particular shows frequent disappointments. Agreements work when the market is pushing in the same direction: when fundamentals diverge, then agreements break down. It is not surprising, then, that informed opinion tends to see the market as imperfect, but probably not perfectable: the best may be the enemy of the good.

The 2007/08 price spike has created a flurry of proposals to prevent a repetition, including several that involve holding more physical or virtual reserves. They vary in terms of ambition and scope, technical challenges, the degree of international co-operation required, and their cost. Some are quite novel, others are variants on measures that have been taken in the past. Arriving at a firm judgment on the better options is beyond the scope of this paper: that would require detailed analysis of (some of) the proposals, a substantial task.

That said, the apparent weight of evidence and opinion would indicate the following judgments:

- An emergency food reserve and financing facility for the World Food Programme to ensure continuity of food aid and the ability to respond to emerging needs seems justified, although this does not deal with price spikes;
- It is far from clear that a system of co-ordinated public grain reserves could be made to work and would not deter private storage;
- Regional and national stocks may be justified in particular (and probably national) circumstances, but otherwise seem costly;
- A virtual reserve might be addressing a problem that does not exist. There are serious doubts as to its feasibility;
- Diverting grains from animal feed and industrial use, through use of options, could be a cheaper way to obtain food to be channelled to poor and vulnerable people when price spikes are forming. Given administrative costs it may only be attractive where governments or agencies are committed to delivering food to the vulnerable;
- Proposals for more reporting of stocks and co-ordination could be useful. Some are sceptical that reporting of stocks could be improved given that so much is held privately and stock holders would have little or incentive to reveal what they hold; but given that some countries are able to collect reasonably detailed data, this cannot be so difficult if the will were there. These ideas look to be things that FAO might lead or carry out;
- There is plenty of support for negotiating under the WTO to have export restrictions banned or severely curtailed;
- An international clearing house for grain trading is intriguing, but perhaps needs more work on the detail to explore its feasibility and desirability;
- The proposed food import finance facility seems to replicate an existing IMF scheme that needs to be made more agile, a task that the Fund apparently has in hand; and,

- Production reserves would produce food too late to prevent spikes and potentially act pro-cyclically, driving prices down when they are already falling

This suggests that the proposals for an emergency reserve and outlawing export bans deserve pursuing. The same may be said of trying to get better information on stocks. For some countries and agencies, the proposal to see how options and other contracts might be used to divert grain from other uses to food may be useful. More detail is needed on the international grain clearing house. Ideas about an international food agency and a food import financing facility can be seen as calls for FAO and IMF, respectively, to work more effectively on their mandates.

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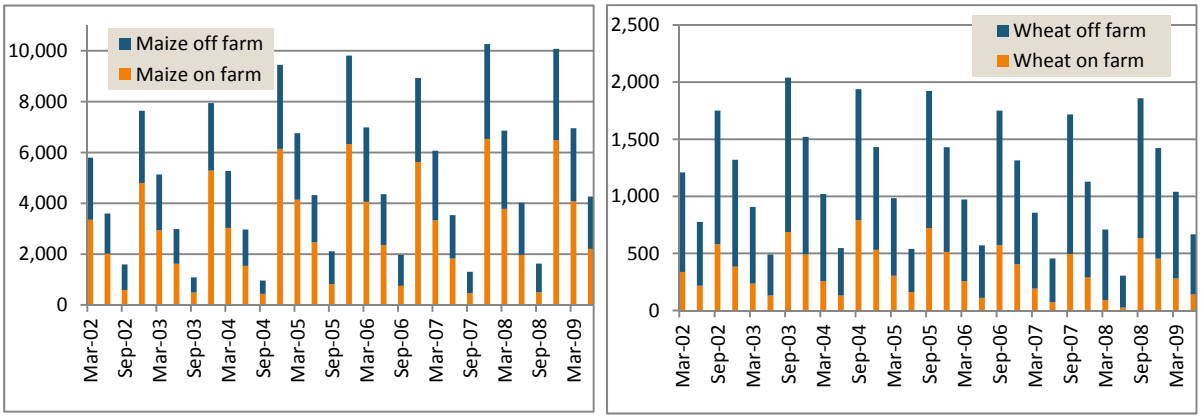
Annex I: More detail on data and reporting

USDA's National Agricultural Statistics Service (NASS) reports quarterly (December, March, June, September) estimates of US stocks held on-farm and off-farm, although it still doesn't differentiate between privately and publically held stocks. Off-farm stocks include those held at mills, elevators, warehouses, terminals, and processors. Estimates are based on surveys conducted in the first two weeks of the month to which the data estimates refer. Over 80 thousand surveys are used to generate the on-farm statistics. Producers surveyed (selected from a list of all producers) are asked to disclose total quantities of grain stored in their operations as of the first of the month in which the survey is conducted—whether for **feed**, **seed**, or **sale**, as well as **any stored under a government programme**. Off-farm stocks surveys attempt to capture all known commercial grain storage facilities—around 9 thousand with over 9 billion bushels of storage capacity. They usually succeed in accounting for facilities accounting for 90 percent of total storage capacity. Estimates are made for missing facilities.

NASS reviews the survey data for reasonableness and consistency. Reliability of the on-farm estimates is subject to sampling variability, while reliability of both on- and off-farm surveys are subject to errors including omission, duplication, imputation for missing data, and error in reporting, recording, and processing.

Figure I.1: US maize and wheat stock estimates[34] March 2002 – June 2009 (millions of bushels)

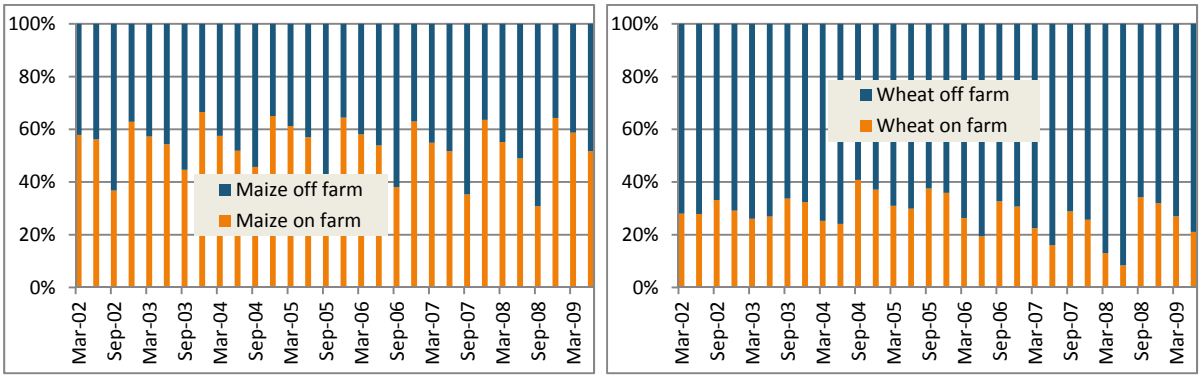


Source: USDA NASS (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1079)

There is a large difference in proportion of maize held on/off farm and proportion of wheat held on/off farm at any particular time. The on/off farm ratio for maize is about 50/50, while for wheat it is about 30/70.

[34] The maize marketing year runs from September to August, the Wheat from June to May

Figure I.2: US maize and wheat stock estimates March 2002 – June 2009 (percent)



Source: USDA NASS (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1079)

Table I.1: Marketing years by which USDA data is reported for top stockholders of maize, rice, and wheat

Top 20* **maize** stockholders 2005/06 to 09/10 average of beginning stock

Country	Average stock 05/06 to 09/10est (1000 tonnes)	Marketing year
United States	44601	SEP To AUG
China	40180	OCT To SEP
EU-27	7219	OCT To SEP
Brazil	6491	MAR To FEB
Mexico	3656	OCT To SEP
South Africa	2782	MAY To APR
Iran	1864	OCT To SEP
Canada	1651	SEP To AUG
Korea, South	1545	OCT To SEP
Argentina	1433	MAR To FEB
Japan	1108	OCT To SEP
Colombia	1022	OCT To SEP
Ukraine	966	OCT To SEP
Paraguay	905	JAN To DEC
Indonesia	855	OCT To SEP
Taiwan	748	OCT To SEP
Egypt	678	OCT To SEP
Pakistan	605	JUL To JUN
Philippines	586	JUL To JUN
Turkey	553	SEP To AUG

Top 20 **rice** stockholders 2005/06 to 09/10 average of beginning stock

Country	Average stock 05/06 to 09/10est (1000 tonnes)	Marketing year
China	38294	JAN To DEC
India	12090	OCT To SEP
Indonesia	4694	JAN To DEC
Philippines	4534	JUL To JUN
Thailand	2748	JAN To DEC
Japan	2398	NOV To OCT
Vietnam	1490	JAN To DEC
EU-27	1128	SEP To AUG
United States	1097	AUG To JUL
Brazil	1031	APR To MAR
Iran	905	JAN To DEC
Korea, South	768	NOV To OCT
Pakistan	621	NOV To OCT
Peru	587	JAN To DEC
Bangladesh	570	JUL To JUN
Burma	565	JAN To DEC
Egypt	523	OCT To SEP
Nigeria	520	OCT To SEP
Saudi Arabia	447	JAN To DEC
Malaysia	440	JAN To DEC

Top 20 **wheat** stockholders 2005/06-09/10 average

Country	Average stock 05/06 to 09/10est (1000 tonnes)	Marketing year
China	39837	JUL To JUN
EU-27	19297	JUL To JUN
United States	13827	JUN To MAY
Canada	7175	AUG To JUL
Australia	6202	OCT To SEP
India	6062	APR To MAR
Syria	4171	JUL To JUN
Egypt	4013	JUL To JUN
Russia	3872	JUL To JUN
Iran	3569	APR To MAR
Pakistan	2263	MAY To APR
Kazakhstan	2215	JUL To JUN
Algeria	2207	JUL To JUN
Morocco	2079	JUL To JUN
Saudi Arabia	1947	JUL To JUN
Ukraine	1789	JUL To JUN
Japan	1341	JUL To JUN
Turkey	1269	JUN To MAY
Indonesia	1249	JUL To JUN
Uzbekistan	1179	JUL To JUN

***Calculated as average of beginning year stock, where beginning stock in year t = ending stock of t-1)**

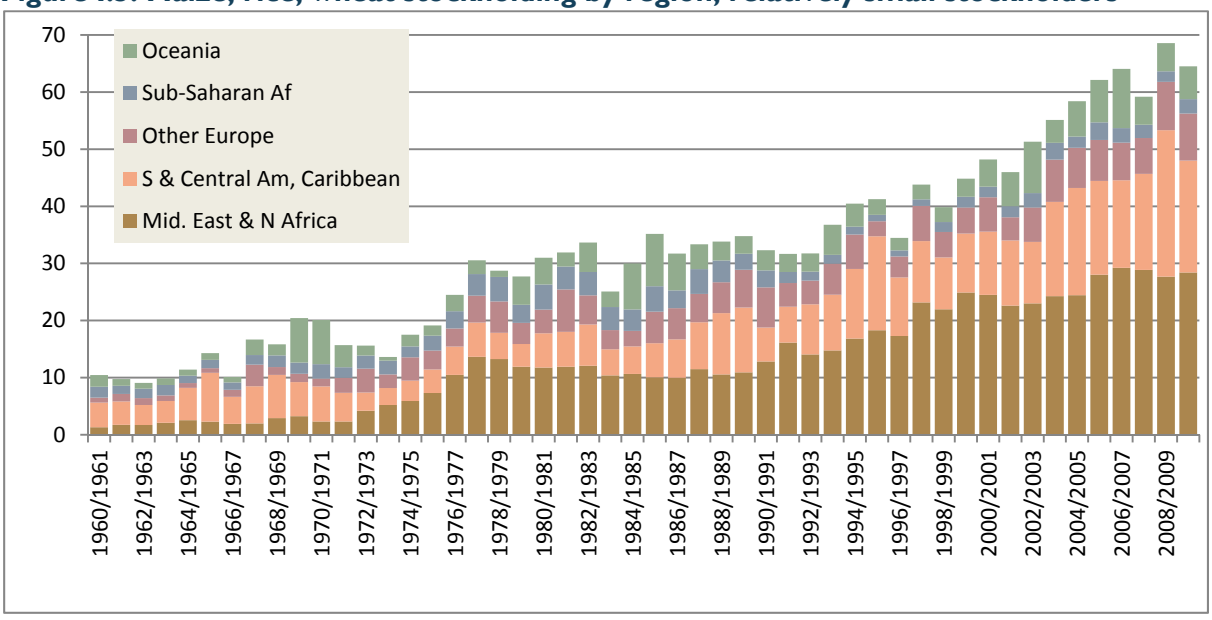
Source; USDA FAS

Table I.2: USDA Foreign Agricultural Service stock data availability; last 10 years

Stock data for maize and/or rice and/or wheat exists within last 10 years	Stock data on main staple unavailable within last 10 years while consumption data exists
North America	**North America**
Canada; Mexico; United States	
East Asia	**East Asia**
China; Japan; ***South Korea***; Taiwan	Hong Kong; North Korea; Mongolia
Former Soviet Union	**Former Soviet Union**
Armenia; Azerbaijan; Belarus; Georgia; Kazakhstan; Kyrgyzstan; Moldova; Russia; Tajikistan; Turkmenistan; Ukraine; Uzbekistan	
European Union	**European Union**
EU-27	
South and Southeast Asia	**South and Southeast Asia**
Bangladesh; *Burma*; ***India***; Indonesia; ***Malaysia***; ***Pakistan***; ***Philippines***; Singapore; Sri Lanka; ***Thailand***; ***Vietnam***	Afghanistan; Bhutan; Brunei; Laos; ***Nepal***; ***Cambodia***
Middle East and North Africa	**Middle East and North Africa**
Algeria; ***Egypt***; *Iran*; ***Iraq***; Israel; ***Jordan***; Morocco; Oman; Saudi Arabia; *Syria*; Tunisia; Turkey	Bahrain; Kuwait; ***Lebanon***; Libya; United Arab Emirates; ***Yemen***
South America, Central America, Caribbean	**South America, Central America, Caribbean**
Argentina; ***Bolivia***; ***Brazil***; Chile; Colombia; ***Costa Rica***; Cuba; ***Dominican Republic***; *Ecuador*; El Salvador; ***Guatemala***; ***Guyana***; Haiti; ***Honduras***; Jamaica; Nicaragua; Panama; Paraguay; Peru; Uruguay; Venezuela	Barbados; Suriname; Trinidad & Tobago
Other Europe	**Other Europe**
Bosnia and Herzegovina; Croatia; Macedonia; Norway; Serbia; Serbia & Montenegro; Switzerland	Albania
Sub-Saharan Africa	**Sub-Saharan Africa**
Congo DR; Cote d'Ivoire; ***Ethiopia***; Ghana; ***Kenya***; ***Malawi***; Mali; Mozambique; ***Nigeria***; ***Senegal***; South Africa; Sudan; *Tanzania*; *Zambia*; Zimbabwe	Angola; ***Benin***; Botswana; Burundi; ***Cameroon***; Cape Verde; Central African Republic; Chad; Congo; Djibouti; ***Eritrea***; Gabon; The Gambia; *Guinea*; Guinea-Bissau; Lesotho; Liberia; Madagascar; ***Mauritania***; Mauritius; Niger; Reunion; Rwanda; ***Sierra Leone***; Somalia; Swaziland; ***Togo***; Uganda
Oceania	**Oceania**
Australia; New Zealand	Fiji; Papua New Guinea

Note: Responses to the 2007/08 price spike→ Countries that implemented export bans or restrictions appear *in italics and highlighted in yellow*. Countries which released stock at subsidised prices appear with *** in bold red**. (Demeke et al, 2008)

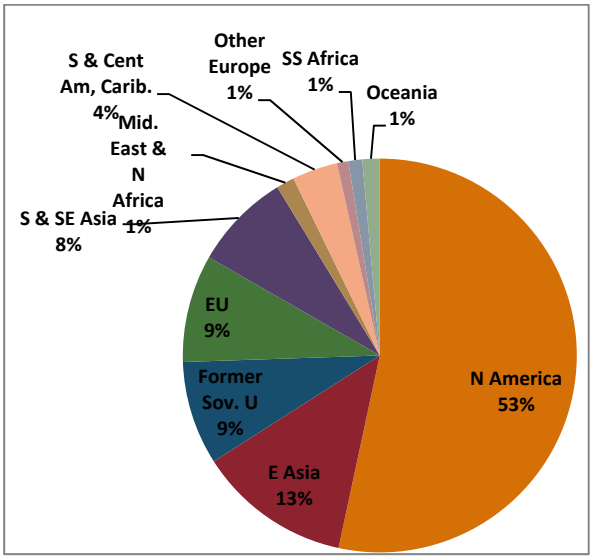
Figure I.3: Maize, rice, wheat stockholding by region, relatively small stockholders



Source: Constructed using data from USDA FAS

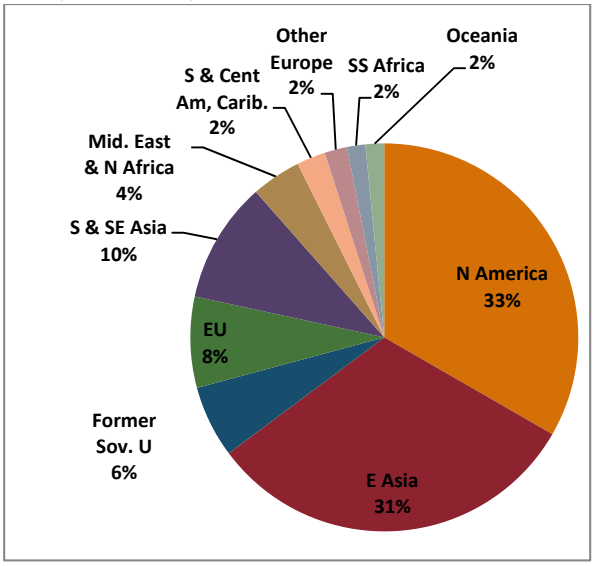
Figure I.4: Beginning stocks of maize, rice, and wheat; averages by decade

1960/61 – 1969/70

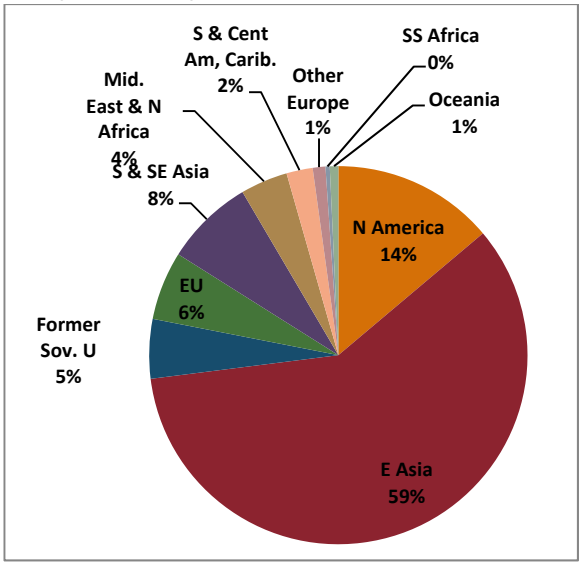


In the last decade, the percentage of maize, rice, and wheat stocks held by **East Asia** (mostly China) declined, reversing the rising trend of the previous four decades. This means a larger **proportion** of the world's stocks are to be found in **North America** despite their consistent reduction in proportion over the first four decades of the period. Notably proportionally South **and Southeast Asian** stocks, as well as those in **South America** and the Middle East and North Africa increased over the last decade from the previous one. The **EU** has kept a 6% share since the 1980s. Stocks in **Sub-Saharan Africa** have lately represented only 1% of global totals.

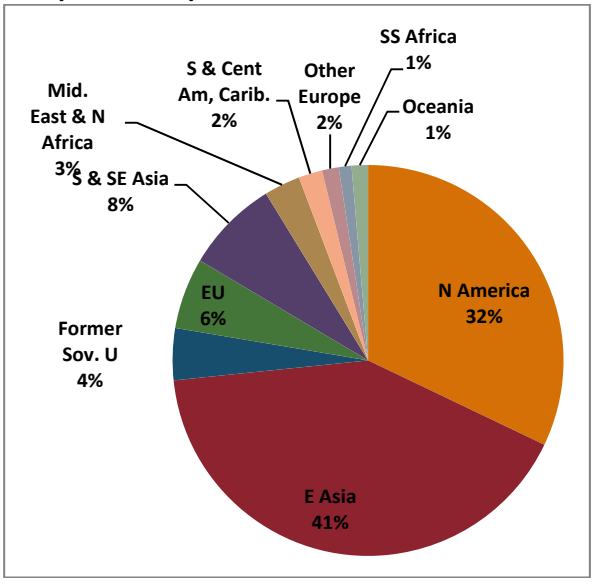
1970/71 – 1979/80



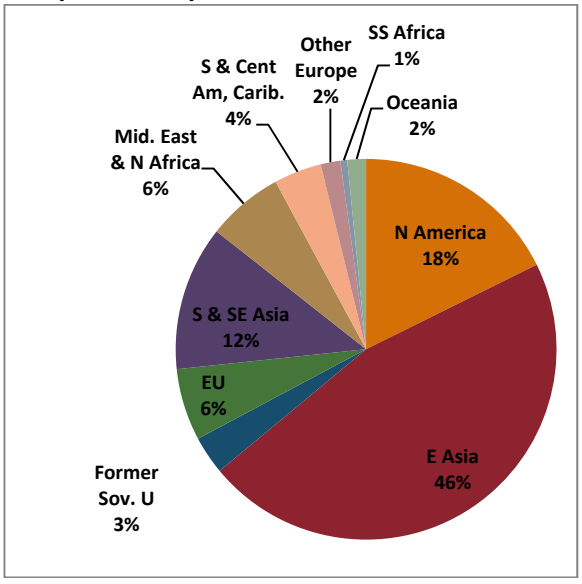
1990/91 – 1999/2000



1980/81 – 1989/1990



2000/01 – 2009/10

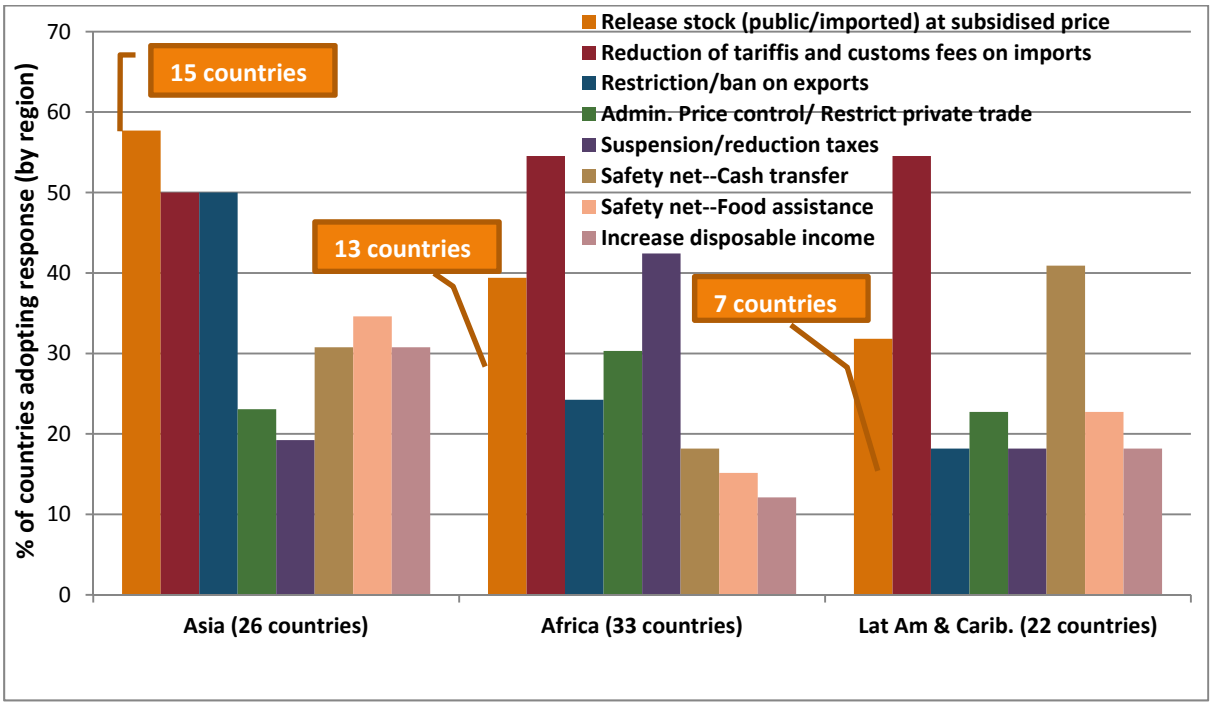


Source: Constructed using USDA FAS data

Annex II: More detail on stockholding in countries that released stock in reponse to the spike

Release of stocks was one of the most common government responses to the 2008 spike. The figure below gives the regional breakdown of responses (flagged by FAO up to Dec 2008).

Figure II.1: Responses to the 2008 food prices spike



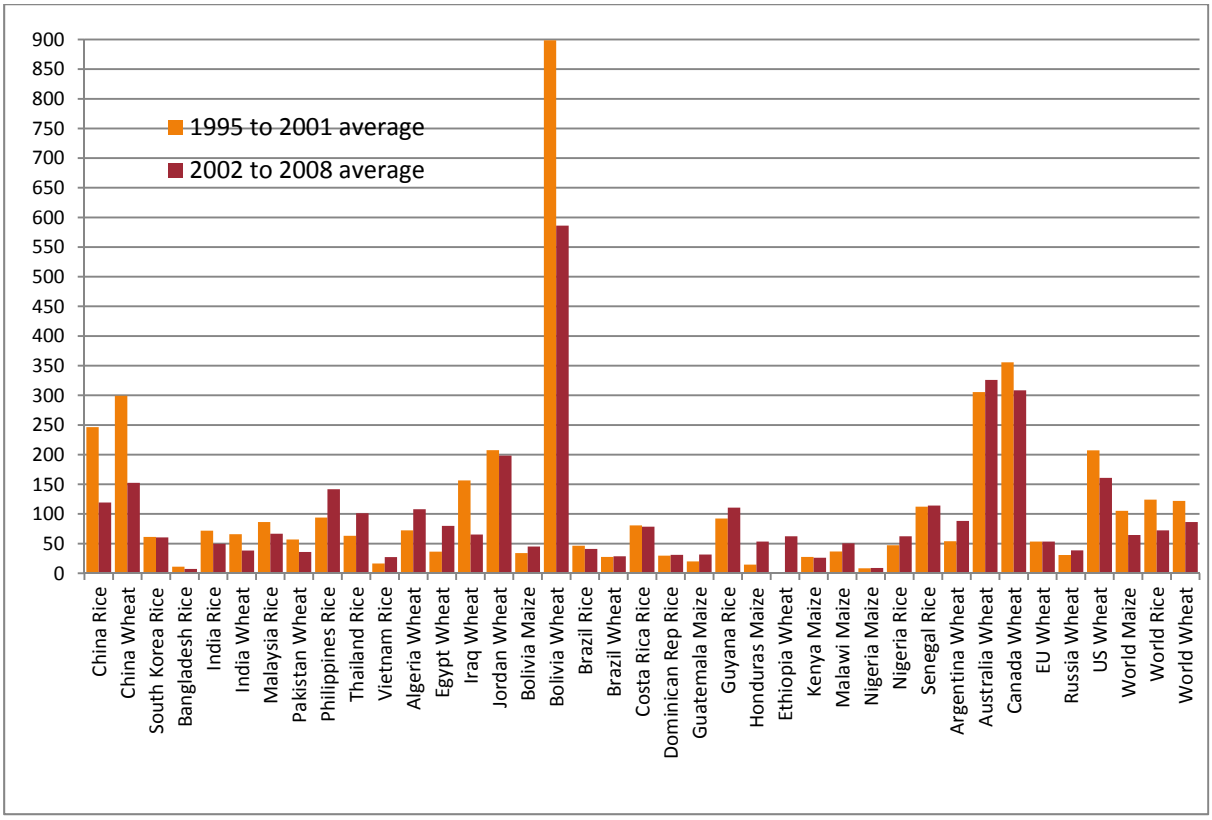
Source: Constructed using data from Demeke et al, 2008

The next two figures show stock levels for a selection of countries chosen by whether or not they released stock, as well as data availability on stockholding of any of these countries' major food staples. Equivalent statistics are also presented for a selection of OECD countries for purposes of comparison.

In the first figure (II.2), the stock levels are expressed in days of use—a direct relation between ending stocks and average daily consumption. In the second figure (II.3), the stock levels are expressed in a slightly different way—as a measure of how many days they could supply each member of the population with 1800 kilocalories.

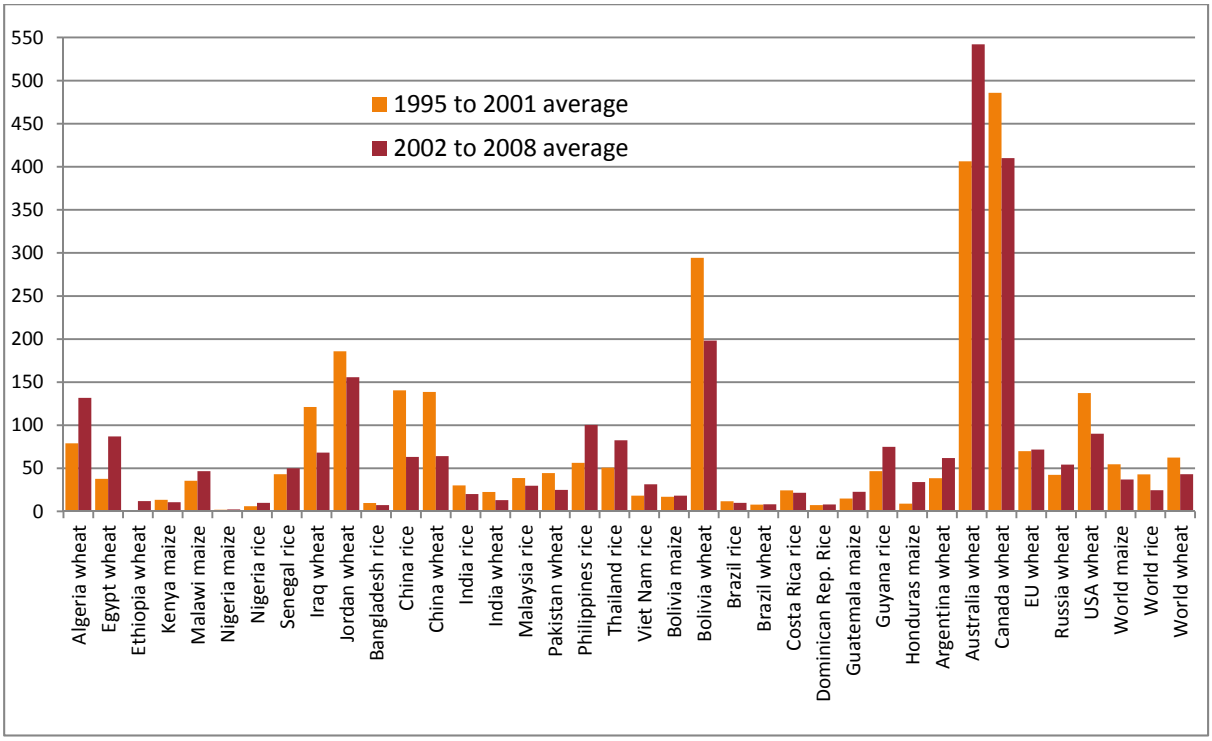
Days of use is the more traditional measure. The World Bank (2008) cites recommended stockholding for food security purposes to be 18-20% of use. If we take this to mean a percent of a year's worth of food, the equivalent in days is about 70 days.

Figure II.2: Stocks expressed in days of use



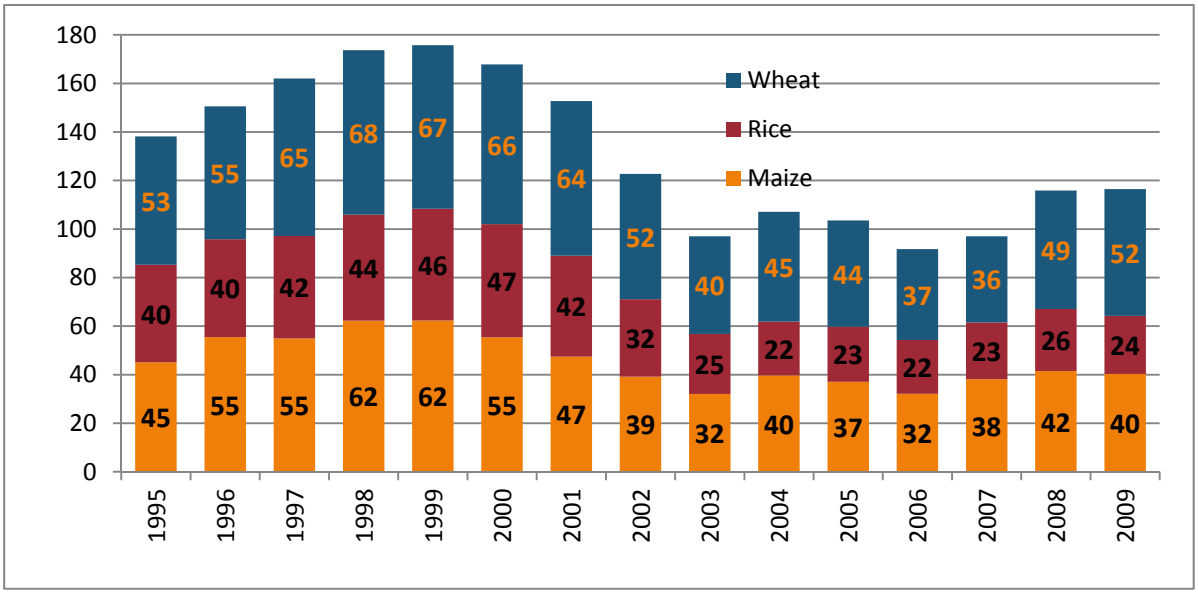
Source: Calculated using data from USDA FAS

Figure II.3: Stocks expressed in days they could potentially fulfill population energy requirements of 1800kcal/capita



Source: Constructed using data from USDA FAS and UNPD

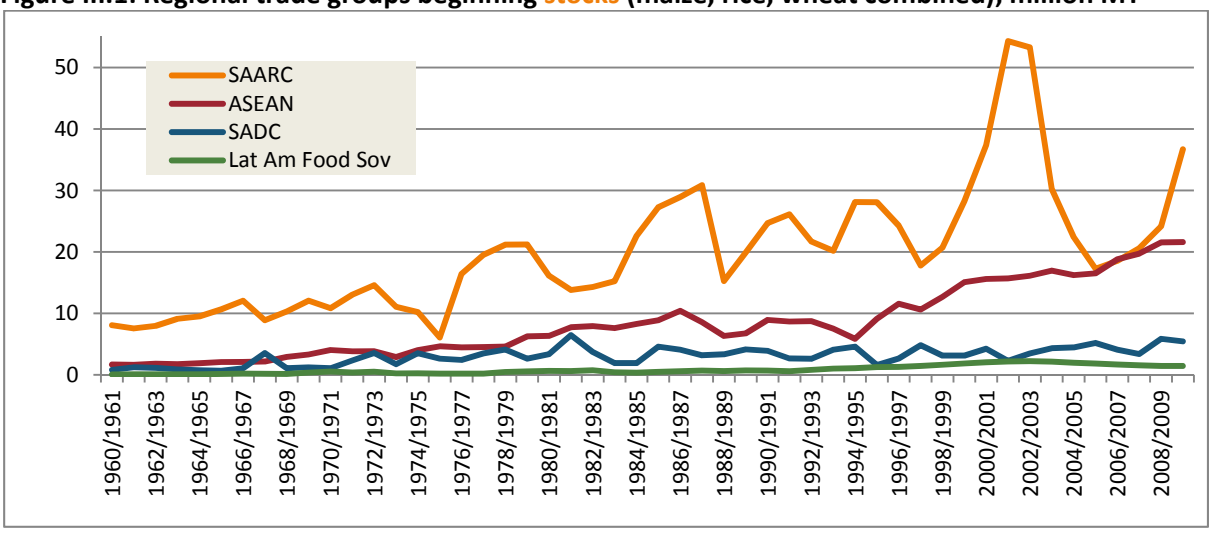
Figure II.4: Global grain stocks expressed in number of days sufficient to supply each person with 1800kcal



Source: Calculated using data from FAOSTAT and UNPD

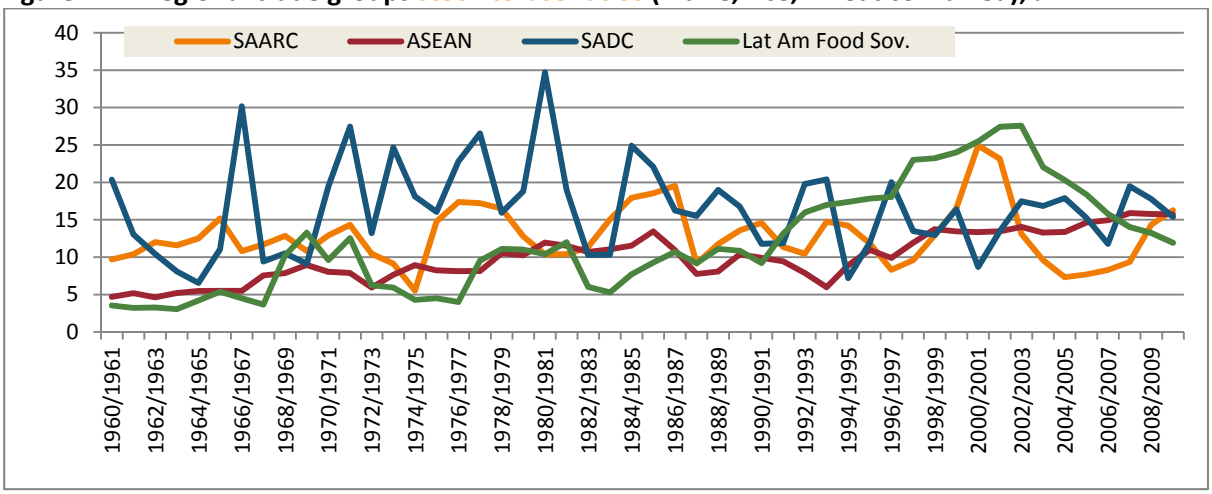
Annex III: Stocks history in proposed regional stockholding groups

Figure III.1: Regional trade groups beginning stocks (maize, rice, wheat combined); million MT



Source: Constructed using data from USDA FAS

Figure III.2: Regional trade groups stock-to-use ratios (maize, rice, wheat combined); %



Source: Constructed using data from USDA FAS

Annex IV: Grain for feed uses in 1992 & 2002

Table III.1: Grain uses by percent in 1992[35] and 2002 for certain regions[36]

		Maize			Rice			Wheat		
		1992	2002	Δ	1992	2002	Δ	1992	2002	Δ
Developed Countries	Feed	75.9	72.3	-3.55	0	0.1	0.04	30.6	34.9	4.29
	Food, Processing[37]	22.6	26.2	3.6	93.9	92.6	-1.31	57.4	54.9	-2.46
	Seed, Waste, Other	1.6	1.5	-0.05	6	7.3	1.27	12	10.2	-1.83
East & South East Asia	Feed	53	52.7	-0.3	2.5	2.4	-0.09	16.7	16.1	-0.58
	Food, Processing	38.5	36.1	-2.39	90.8	90.6	-0.24	81.7	83	1.39
	Seed, Waste, Other	8.5	11.2	2.69	6.7	7	0.34	1.6	0.8	-0.81
South America	Feed	69.8	68	-1.73	0.2	0.1	-0.06	2	3.8	1.79
	Food, Processing	20.7	22.9	2.14	88.1	89.9	1.85	91	90.2	-0.82
	Seed, Waste, Other	9.5	9.1	-0.42	11.7	10	-1.78	6.9	6	-0.97
South Asia	Feed	17.7	38.5	20.8	0.4	0.4	0.01	1.3	1.3	-0.01
	Food, Processing	65.4	46.5	-18.8	92	92	0.02	89.0	90	1.01
	Seed, Waste, Other	16.9	14.9	-1.97	7.6	7.6	-0.03	9.7	8.7	-1
Sub Saharan Africa	Feed	9.2	8.8	-0.48	2	0.8	-1.23	0.1	0.2	0.09
	Food, Processing	78.1	80.1	1.95	85.2	85	-0.13	94.7	95.9	1.17
	Seed, Waste, Other	12.6	11.2	-1.47	12.8	14.2	1.36	5.2	3.9	-1.26
Near East	Feed	53	57.3	4.35	3.3	5.4	2.12	3.8	7	3.27
	Food, Processing	38.6	35	-3.63	90	89.4	-0.62	79.3	78.8	-0.56
	Seed, Waste, Other	8.4	7.7	-0.72	6.7	5.3	-1.49	16.9	14.2	-2.71

Source: Constructed using data from FAOSTAT

The data shows considerable variation in proportion of grains going to feed uses across crops and regions. Nonetheless, most of the regions shown experienced little variation in proportions of crop going to feed over the period in question. The striking exception in this group is maize used for feed in South Asia, which increased proportionally by over 20 percent. Maize is a relatively minor crop in the region compared to wheat and rice. The next largest change, in the Near East region, saw proportional feed use of maize increase by just over 4 percent. At the same time, developing countries proportional maize use for feed declined by almost 4 percent, while maize for processing and wheat for feed increased proportionally; a sign of the increasing use of maize in fuel crops and substitution of wheat for feed purposes in developed regions.

[35] At the moment 2002 is the latest year available for FAOSTAT's supply utilisation account data. 1992 is chosen to show the change over a decade.

[36] World total data and certain regional aggregates (developing regions for example) are not available, hence the selection presented

[37] The available data doesn't distinguish between processing for food products and alcohol for fuel or otherwise)