SAFEGUARDING FOOD SECURITY IN VOLATILE GLOBAL MARKETS

EDITED BY

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Chapter 22

Strengthening global food market monitoring

Jim Greenfield and Abdolreza Abbassian[1]

> *I cannot tell you how many thousands of times I have traded on information that 24 hours later proved to be at least partially inaccurate or irrelevant.* (Paul Tudor Jones, hedge fund manager.[2])

The setting

Sharp price rises of basic food commodities on world markets in recent years have been the subject of intense interest and concern on the part of consumers and importers everywhere. Doubts have been voiced about whether international markets can be relied upon to meet importing countries' needs, and, for this reason, there is concern over food security implications. This is part of the wider issue of price volatility that has been the subject of earlier chapters in this book, where the effects of sharp price declines for producers have been examined. Yet, over the long-run, periods of high world prices have been less frequent than declines – roughly one year in four in the case of cereals, and something similar in the case of oilseeds, oils and meals. This helps to explain why the bulk of both international and national efforts have been directed at addressing problems of low, rather than high, prices. Thus, over the years, enormous sums have been spent on buttressing farm incomes largely in richer countries, while far smaller sums on keeping consumer prices at accessible levels mainly in poorer countries. Reflecting this imbalance, most of the trade liberalization negotiations have focussed on reducing and constraining support to producers. Liberalization was widely expected to lower price variability even though, at the same time, a reduction in carryovers was also expected, which on its own would act to increase price variability.

Over the past few decades, international efforts to tackle price volatility focused on two main approaches:

- the attempt to negotiate international commodity agreements to stabilize prices, which saw the greatest thrust in the 1970s, after which they have been rather low-key; and
- the development of various compensatory financing arrangements, that is the International Monetary Fund's Compensatory Financing Facility (CFF) – which have provided some help to eligible countries, but nothing in any way comparable to producer support in many Organisation for Economic Co-operation and Development (OECD) countries.

[1] Jim Greenfield, former director of the Commodities and Trade Division (FAO) and Abdolreza Abbassian, Trade and Markets Division (FAO). The authors express their sincere thanks to Concepción Calpe and Peter Thoenes for their valuable comments and suggestions.

[2] Interview in Financial Times (2010b).

Currently, there is growing interest in the methods that might be used to limit the impact of non-commercial financial sector investment in futures contracts for food commodities, a subject discussed in Chapter 13. Whatever the merits of current proposals, it is clear that this type of approach could affect price volatility and perhaps serve to reduce extreme fluctuations. In this sense, moves to regulate futures markets are akin to the earlier approaches to international commodity agreements that operated on the physical volumes traded so as to help stabilize prices in the market.

The basic causes of periods of sharply rising market prices have varied somewhat over the years.

In the mid-1970s, during the world food crisis, grain stocks had been very low, prices of petroleum and inputs had been rising beforehand, when a sharp rise in import demand by the former USSR sent grains prices soaring. In the case of rice stocks, which were also low, a very thin world market was not able to handle the sudden surge in import demand that followed a poor monsoon that afflicted the rice-growing belt of South Asia. Some exporters introduced export taxes, and there was a brief export ban on oilseeds by the world's largest exporter, the United States of America.

In the mid-1990s, while stocks had been run down as part of the policy to curb public support of agriculture during the liberalization process, the deterioration of the global supply/demand situation caused world prices to soar.

In the 2008-2010 double-spike of cereals and oilseeds prices, which also affected livestock and dairy products, the main causes were the low level of exportable supplies in a period of rising utilization (in part owing to sharply increased use of grains and oil crops as biofuel, as well as a welcome rise in consumption in some rapidly expanding developing economies, particularly in Asia). For some cereals and oilseeds, the spikes were aggravated by substantial purchases of futures contracts by non-commercial agents and by national trade policies, including temporary export bans that limited the market response of a number of countries.

In 2010 there was an unexpected weather-driven drop in grain production in some key exporting countries together with restrictions on exports by some.

Growing demand for more accurate and timely market information

In September 2010, the one-day Extraordinary Intersessional Meeting of the FAO's Intergovernmental Group (IGG) on Grains and Rice noted that among the root causes of recent price volatility was the lack of reliable and up-to-date information on crop supply and demand and export availability. Therefore, the IGG recommended that the FAO intensify its information gathering and dissemination at all levels (FAO, 2010). While this recommendation was addressed to the cereals sector, there is little doubt that the same can be said of the other major foodstuffs too. The problem is widespread. Despite the increase in the volume of raw data and the greater speed of transmitting information over recent years, the capacity to analyse the mass of often conflicting and variable quality data and to disseminate the resulting analyses has not kept pace particularly in the public, free-access sector.

The notion of the price system as an information entity is alluded to extensively throughout this volume. Chapter 14, for instance, highlights the role of information in expectations formation and its consequence on price determination. It was shown that "uninformed trade" may accentuate price movements to the extent that if the number of uninformed traders dominate those who are informed, "price bubbles" could be generated. Information also plays an important role in determining the behavioural dimensions of markets. Traders'

inability to give proper weight and context in processing new information may lead to an over or under-reaction in price response. Therefore, a corollary of enhancing information provision in the public domain would be to improve the efficiency of the price system.

At the national level, the capacity of many countries to collect and process basic agricultural data has often deteriorated, and public statistical services have difficulties undertaking such forward-looking exercises as crop forecasts, let alone comprehensive supply/demand analysis and trade forecasts. The IGGs recognized this weakness and recommended action to strengthen capacity of all partners "in relation to monitoring planting intensions, crop development and domestic market information". As one of the partners, FAO was also requested to improve its own contribution.

The approach that FAO is pursuing in order to enhance its global monitoring activity is based on the fact that the bulk of world production, consumption, stocks and trade is accounted for by a relatively limited number of countries. A significant improvement in the ability to monitor world food markets will necessarily involve making improvements to this key set of major country/commodity elements. As shown in Tables 22.1 to 22.4, for such important food crops as rice, wheat, coarse grains and soybeans, access to accurate information on production in a few countries can go a long way in helping to understand market trends at the global level. For instance, in the case of wheat and rice, less than ten countries account for over 90 percent of world production. Good information on these countries would alone make for a much-improved picture of the global situation. Of course, it is always desirable to strengthen food monitoring for all countries, but it is felt that the most efficient way to respond to the type of requirements listed by FAO's IGGs is to focus on the main market movers.[3]

Regarding the quality of the short-run supply/demand assessments, information on all of these markets movers has strong points as well as weak ones. Some historical databases, on which forecasts are necessarily founded, are weak; others have highly variable weather patterns, or rely on rain-fed production which makes monitoring particularly difficult; some simply don't publish information on key variables; and others are vast countries with many different crop seasons that make aggregation difficult. In addition, across crops, planting and harvesting periods are often very different in most countries. As illustrated in Table 22.5, given a limited potential for expanding total agricultural land in the short-run, changes in plantings of one crop can influence the size of land dedicated to other crops, which is another important factor that will require closer monitoring.

In the sections below, we suggest how to improve monitoring systems. The list is illustrative and analysts will have to develop detailed plans to improve assessments country-by-country and commodity-by-commodity.

Production forecasts

It is evident that production forecasts remain at the centre of world food market assessments.[4] Though it has been long perceived to be the main cause of variations in supply and demand

[3] In fact, most other countries are covered by the FAO's Global Information and Early Warning System (GIEWS), which has been recognized internationally as having a comparative advantage in making food assessments in food deficit developing countries. The FAO-GIEWS already works closely with the other major agencies involved – the World Food Programme (WFP) as well as other UN agencies and government and non-government organizations – and since its inception in late 1970s has built up in-depth country databases especially for cereals.

[4] Although, as will be discussed later, there are also significant sources of uncertainty with consumption, stocks and trade.

Table 22.1: Wheat: leading producers and their global share

Wheat production: leading producers and their global share		
Country	Production (2008-2010 average)	Global share
	(million tonnes)	*(percent)*
EU	141.5	21.0
China (Mainland)	114.2	17.0
India	80.0	11.9
United States of America	62.8	9.3
Russian Federation	56.2	8.3
Canada	26.2	3.9
Australia	23.4	3.5
Pakistan	23.0	3.4
Ukraine	20.8	3.1
Turkey	19.3	2.9
Kazakhstan	15.0	2.2
Iran Islamic Rep. of	12.4	1.8
Argentina	9.1	1.4
Egypt	8.4	1.2
Uzbekistan	6.5	1.0
Other countries	54.5	8.1
World	673.2	

balances, rarely has this been so evident as in 2010 when grain production was hit by unexpected weather shocks in several major producing regions almost simultaneously. Moreover, with an increasing proportion of world grain supplies originating from the Black Sea region,[5] an area known for its large variations in yields, unexpected production variations are likely to emerge as a more common feature rather than an exception in the years to come.

In the few months prior to the 2010 price surge, international and national agencies were expecting bumper crops and a generally favourable supply outlook world-wide for the 2010/11 marketing season. The drought-reduced production in the Russian Federation coupled with reduced harvests (also weather related) in other major Commonwealth of Independent States (CIS) producing countries, as well as in Canada and in the European Union, changed the outlook considerably. Events in the Russian Federation, which included repeated downward revisions to production forecasts and the subsequent ban on exports, acted as a leading catalyst for the surge in world price of major grains between late July and mid-August 2010. Given the country's growing importance as a major grain supplier to world markets (the world's fourth largest wheat exporter in 2009/10), a sudden substantial cut in its production or exports was bound to have a major bearing on world markets, as it did in 2010.

Although the first official indication of a major fall in 2010 grain production in the Russian Federation appeared in late July (i.e. few weeks before the harvest), many private agents, both inside and outside the country, were forecasting a fall in output from April. In retrospect it seems that private forecasters were monitoring crop conditions in major growing

5 The major CIS exporting countries accounted for almost 30 percent of the global wheat trade in 2009 as compared with only 4 percent in 2000.

Table 22.2: Rice: leading producers and their global share

Rice production: leading producers and their global share		
Country	Production (2008-2010 average)	Global share
	(million tonnes)	*(percent)*
China (Mainland)	194.5	28.2
India	143.1	20.8
Indonesia	63.6	9.2
Bangladesh	48.5	7.0
Viet Nam	39.2	5.7
Thailand	31.4	4.6
Myanmar	30.8	4.5
Philippines	16.5	2.4
Brazil	12.0	1.7
Japan	10.8	1.6
United States	10.1	1.5
Pakistan	8.9	1.3
Cambodia	7.6	1.1
Korea Rep. of	6.4	0.9
Egypt	5.8	0.8
Other countries	60.0	8.7
World	689.2	

areas more closely than the public authorities. Because the FAO based its production forecasts for major producing countries on official sources, its earlier forecasts for grain production in the Russian Federation were too high and had to be revised down sharply several times, as shown in Figure 22.1.

A similar situation emerged in the United States of America, this time with regard to maize production. The United States of America is the world's largest producer, user and exporter of maize. For this reason, the maize supply and demand balance in the United States of America has a major impact on world maize markets. The early expectation for the 2010 maize crop in the United States of America pointed to an increase in output (from 2009) to a near record level. Instead, as the season progressed, unfavourable weather conditions (too much rain) hampered yields, reduced production prospects and eventually resulted in maize production falling below the 2009 level. In spite of unfavourable weather conditions during the growing season, the official forecast for maize production in 2010 remained high until very near the harvest. Only in early October (i.e. one month before the harvesting period) crop forecasts were revised sharply lower by the United States Department of Agriculture (USDA) in their World Agricultural Supply and Demand Estimates (WASDE) report of October 2010. This late revision contrasted with expectations of private agents, such as traders, investment firms and banks, who were forecasting lower yields (and hence lower production) from August onward. In most cases, private agents utilized the official area estimates[6] published by the USDA but based their production forecasts on their own yield surveys and field observations. For example, a leading trading house reported that its "early and accurate read

[6] The estimates were derived from an extensive survey of maize growers by the USDA, which is usually carried out every year in early June.

Table 22.3: Coarse grains: leading producers and their global share

Coarse grains production: leading producers and their global share		
Country	Production (2008-2010 average)	Global share
	(million tonnes)	*(percent)*
United States of America	336.2	29.9
China (Mainland)	174.8	15.5
EU	153.1	13.6
Brazil	57.7	5.1
India	37.2	3.3
Russian Federation	31.6	2.8
Mexico	30.4	2.7
Canada	24.1	2.1
Argentina	24.1	2.1
Ukraine	23.0	2.0
Nigeria	21.7	1.9
Indonesia	17.3	1.5
Australia	13.6	1.2
South Africa	13.4	1.2
Ethiopia	12.8	1.1
Other countries	154.6	13.7
World	1 125.4	

Table 22.4: Soybeans: leading producers and their global share

Soybean production: leading producers and their global share		
Country	Production (2008-2010 average)	Global share
	(million tonnes)	*(percent)*
United States of America	81.7	35.4
Brazil	62.0	26.9
Argentina	44.2	19.2
China	14.4	6.2
India	8.8	3.8
Paraguay	6.2	2.7
Canada	3.2	1.4
Bolivia (Plurinational State of)	1.5	0.7
Uruguay	1.3	0.6
Other countries	7.4	3.0
World	230.7	

Table 22.5: Planting and harvesting periods for major crops in leading agricultural markets

													Country % share in:		Crop % share in: total domestic arable land
													World production	World exports	
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*			
Argentina															
Wheat													2.2	8.2	19.7
Maize													2.6	15.1	8.7
Sorghum													4.5	8.6	1.8
Soybeans													17.2	31.0	47.7
Sunflower													12.6	30.0	7.1
Sugarcane													1.4	0.9	1.0
Australia															
Wheat													2.8	11.7	27.1
Barley													4.6	19.3	9.5
Sorghum													2.7	2.2	1.5
Cotton													1.6	6.0	0.5
Rapeseed													3.6	4.0	2.4
Brazil															
Wheat													0.6	0.2	4.4
Maize													5.9	5.6	20.8
Rice													1.9	0.8	6.1
Cotton													4.6	2.0	1.8
Soybeans													25.2	31.0	35.5
Sugarcane													31.2	39.5	9.5

Table 22.5: Planting and harvesting periods for major crops in leading agricultural markets (continued)

Canada															
Wheat													4.0	14.8	22.0
Maize													1.3	0.3	2.5
Barley													8.1	11.9	9.0
Rapeseed													18.5	67.0	11.5
Soybeans													1.4	1.0	2.5
China															
Wheat													16.9	1.5	15.6
Maize													19.8	4.9	17.8
Barley													2.6	0.0	0.6
Sorghum													4.2	0.4	0.4
Oats													2.7	0.0	0.2
Rice													29.5	4.6	19.8
Cotton													27.6	4.0	3.7
Rapeseed													28.2	1.0	5.1
Soybeans													8.2	1.0	6.7
Sunflower													6.1	1.0	0.7
Sugarbeet													2.7	0.2	0.2
Sugarcane													6.8	0.5	1.0

Table 22.5: Planting and harvesting periods for major crops in leading agricultural markets (continued)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Country % share in: World production	Country % share in: World exports	Crop % share in: Total domestic arable land
EU-27															
Wheat													20.0	11.5	23.2
Maize													6.6	0.2	8.6
Barley													39.6	21.4	12.5
Oats													32.7	8.4	2.7
Rapeseed													31.3	2.0	4.2
Sunflowwer													23.	7.0	3.5
Sugar beets													53.4	76.9	2.0
India															
Wheat													11.6	0.4	16.3
Maize													2.0	0.3	4.5
Sorghum													12.6	0.4	5.8
Rice													21.7	15.0	26.3
Cotton													13.8	0.0	5.3
Rapeseed													12.9	11.0	3.6
Soybeans													3.2	4.0	4.2
Sunflower													3.6	0.0	1.2
Sugar cane													19.1	1.3	2.5
Indonesia															
Maize													1.7	0.1	14.8

Table 22.5: Planting and harvesting periods for major crops in leading agricultural markets (continued)

Rice														8.1	0.0	51.0
Soybeans														0.4	0.0	2.5
Sugar cane														2.1	0.5	1.9
Mexico																
Wheat														0.5	0.4	2.4
Maize														3.0	0.0	29.3
Sorghum														9.0	0.0	7.3
Sugar cane														3.5	1.4	2.6
Russia																
Wheat														7.6	9.7	18.5
Barley														12.2	10.1	7.5
Oats														19.5	0.0	2.6
Sunflower														19.2	14.0	4.1
Sugarbeets														8.6	1.7	0.7
South Africa																
Wheat														0.3	0.2	5.4
Maize														1.2	1.3	22.7
Sunflower														2.4	0.0	3.6
Sugar cane														1.5	2.9	2.9
Ukraine																
Wheat														2.6	3.7	14.9
Maize														0.9	1.8	6.1
Barley														6.4	26.1	13.8
Oats														3.0	1.0	1.5
Sunflower														14.3	35.0	11.2
Sugarbeets														6.2	2.2	2.0

Table 22.5: Planting and harvesting periods for major crops in leading agricultural markets (continued)

													Country % share in:		Crop % share in: total domestic arable land
													World production	World exports	
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*			
USA															
Wheat													9.0	24.3	11.8
Maize													40.4	63.6	16.9
Barley													3.2	2.9	0.9
Sorghum													16.2	72.2	1.5
Oats													6.2	1.5	0.4
Rice													1.5	10.8	0.7
Cotton													17.4	29.0	3.0
Rapeseed													1.6	3.0	0.2
Soybeans													38.8	27.0	17.0
Sunflower													4.7	3.0	0.5
Sugarbeets													11.0	2.2	0.3
Sugar cane													2.1	0.7	0.2

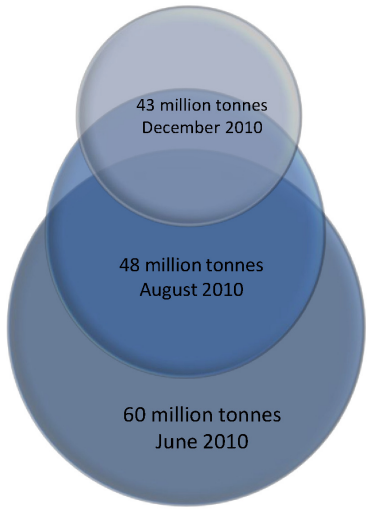
Planting

Harvesting

Planting and harvesting contemporaneously

Note: The tables highlight the main periods with regard to the planting and harvesting of the most relevant agricultural crops at a highly aggregated level. This list does not intend to be exhaustive. The compiled information is based on the last five years. Tables are reproduced from Food Outlook, November 2007.

Figure 22.1: FAO's production forecasts for 2010 wheat crops in the Russian Federation



on the weather, such as a drought in Russia" in the summer 2010 allowed it to anticipate lower crop yields and position its trading strategy accordingly. This resulted in boosting its profit margin and earnings that year (Financial Times, 2010a).

Improved production forecasts

Traditionally, production forecasts are made up of separate forecasts of area and yield. The area planted to an annual crop results from the translation of earlier planting intentions and developments at the outset of the planting period such as delayed rains – a common problem in non-irrigated agriculture and illustrated every year in the time of arrival of the southwest monsoon. Planting intensions are published officially for some crops and by some countries, but by no means for all of them and sometimes the quality of these reports leaves much to be desired.

Private traders have a special interest in production forecasts, and many either circulate their assessments to subscribers to their newsletters or, if contacted, are prepared to share their views with other analysts, often during trade conferences or trade fairs. Subscribing to newsletters, exchanging views and estimates with the private sector and/or attending meetings of traders is a valuable way of supplementing official announcements of planting intensions. Another approach is to arrange for a local consultant to prepare an annual report on the outlook early in the season in each of the key countries. The person should be someone with experience of the sector and with knowledge of the government officers at the Ministry of Agriculture.

For perennial tree crops (palm, olive and coconut), the main factor is not only the area covered, but also the age structure of the trees: the same trees as the year before will have a different potential output because yield varies with the age of the tree. The stock of productive trees can be raised by planting out young trees from nurseries, but this is usually a relatively small factor. Supporting periodic censuses of tree stocks is a great help to making more

accurate output forecasts. Indeed, the improvement of baseline production and area data for all crops annuals and perennials is always of use in improving production outlook work. In cases where part of the problem lies with the data for recent years, one of the strategies could well be the mounting of specialized statistical missions to improve local capacity, undertake censuses and generally improve forecasting ability locally.

The area planted lends itself to model building, and huge numbers of agricultural supply studies have been undertaken over the years. Where suitable studies are available, they can be used to make short-run forecasts of area planted. But a word of caution is needed regarding the use of "off-the-peg" models. They have usually been developed with a different purpose from area forecasting – either for long-term projections, policy modelling or for welfare analyses. Rarely will they be easy to "calibrate" to current levels of production and price. It is usually advisable to construct a relatively simple model tailored to answering the immediate needs of short-run forecasting. This type of model needs to include expected prices of the crop concerned, together with prices of the main competing crop(s) and input costs. It should reflect current policy decisions on, for example, government procurement policies, water allocation decisions and input subsidy programmes.

In addition, high and volatile prices of nearly all major food crops, as experienced in recent years, make advance estimation of the eventual size of plantings more difficult. To most farmers, a higher price of one crop is a reason to plant more of that crop. The other reason is the general anticipation that even if prices were to decline, the decrease could be less than those of the other competing crop(s). In other words, farmers normally make their planting decisions based on relative profitability between among crops. However, in countries where several crops with often similar planting periods are grown, farmers may find it less risky to expand production of not one crop but a combination of crops This factor not only complicates the calculation of the extent of plantings but also may lessen the impact of supply response to high prices.

As the growing season progresses, the focus of forecasting switches from area planted to yield expectations. Again, official forecasts are often made by the major producers, but owing to weather variability and the incidence of unexpected pests or disease there is inevitably a degree of error in any forecast. The hope is that many of these factors will, in a large producing country, balance each other, but, because production is often fairly heavily concentrated in just a few most favourable areas, this hope is not always realized (as witnessed in the Russian Federation and the United States of America in 2010). Weather can nowadays be fairly accurately recorded down to small producing areas, but translating current and accumulated rainfall, soil moisture levels, hours of sunshine at critical junctures in the growth of plants, temperatures, snow cover for winter grains, correlation between the weather and pest and disease build up as well as wind and flood damage and human decisions to hoe, to fertilize and to apply pesticides is a very complex matter and, probably, not an efficient way to forecast yields. For tree crops there are additional factors influencing yield; like the on-off yield cycles or prolonged effects of El Niño (and La Nina) weather patterns on palms for 12 months or more. The development of computer modelling will eventually help, but for the present, it is probably better to sample the opinions of farmers as to the state of their crops. This, again, can be done by government agencies, producer associations and private traders, and their opinions can be sought or bought in the same way as forecasts of area planted.

Hiring local experts is a useful approach towards yield monitoring, provided they can frequently visit the main areas at risk of yield variation. Combing local newspapers and monitoring local radio can also yield helpful warnings. In undertaking detailed local monitoring it is essential to have a good baseline of county/region level area, yield and

production so that local pieces of information can be translated into effects on eventual production. Baseline data and a survey of local media sources should be undertaken as a one-off piece of research to improve monitoring.

Knowing the level of stocks

If production forecasts are the key element in supply/demand forecasts, stocks are the next most sensitive element. Data on end-of-season stocks, the point during the year when they are at their lowest level, are what is required. Figures at any other time represent supply on hand, not carryovers. For example, at the end of the calendar year, inventories of cereals are near their maximum in the northern hemisphere, indeed they are just a few months into the season, after being harvested between August and November. To make a sensible assessment of exportable supplies for the year ahead, it is necessary to take the crop year or the marketing year as the base. Not all food products share the problem of seasonal production peaks. For these commodities the calendar year can be a suitable marketing year. Total stocks are usually taken to be those in the hands of farmers, food industries and the government. Household stocks are usually excluded.

Aggregation over countries presents some technical difficulties, as crop seasons vary. However, over the years, the international agencies making estimates have developed ways of aggregating that are not problematic. For some countries, they aggregate all their food grains on the same marketing year even though the individual crops are on different bases (e.g. India). The important point for international assessments is that these data can be re-aggregated on a more internationally comparable basis. The basic problem with data on carryovers of grains and oilseeds is that they are often not reported and, frequently, not collected. This applies widely to developing countries but to others too. It is difficult to have complete confidence in world carryover figures in this state of affairs. Countries that do not report need to be reminded of the importance of these data in making world food market and also food security assessments. Estimates are being made and will continue to be made by analysts in FAO, International Grain Council (IGC), USDA and so on. These estimates usually have to make at least rough calculations for an initial year, probably when consumption is at a low and it can be fairly assumed that stocks too had been run down to a minimum level. From this point, annual series of net changes in stocks (production + imports-exports-consumption) can be added and subtracted to arrive at stock level estimates for all later years. Care must be taken so that the sum of cumulative net changes in stocks does not become negative at any point, as was the case with estimates of China's stocks made by international agencies in the 1990s, which prompted a re-examination of the underlying data series of flows.[7]

It is helpful, of course, if other sporadic stock estimates, partial or full, are available for particular years in order to refine the series. These estimates should be discussed with the countries concerned and with international experts called to special study group meetings on these questions. Private traders may also be approached to elicit alternative viewpoints on what is arguably the most difficult part of world food market monitoring.

[7] For more information see FAO (2004).

Some doubts over consumption forecasts

Consumption has traditionally been considered the supply/demand element that was the most stable over time; after all, stock changes and trade flows are essentially there to offset the effect of production variations on consumption. Yet, significant (and often little reported) changes do occur in consumption or consumption policies (including policies related to biofuels). In fact, at the beginning of world food crisis in the 1970s, it was the decision made by the former USSR to maintain consumption levels that caused the unexpected surge in grain imports. By stretching the export capacity of the United States of America, it was such imports that helped set off the grain price rise in 1972. Consumption trends and policies probably are one of the factors that need monitoring, as their impact can have some startling effects, especially when there are a number of closely competing commodities, as in the feed-grains/oilcakes complex (or in the vegetable oil complex) where substitution among products plays an important role. A little-regarded trade concession by the then European Economic Community (EEC) let in a flood of cassava imports to its feed market, pushing out correspondingly large volumes of feed-grains in just a few years in the early 1970s. More recently, the high petroleum price combined with government policies to foster biofuels (in the United States of America and to some extent in the European Union and, increasingly, also other countries) led to a huge diversion of grain and various oil-crops away from traditional outlets and into making fuel. Another little-researched area is the widespread use of vegetable oils as *oleo-chemicals* (other than for biofuel) where technical progress, changing consumer habits, product substitution and other factors cause the market to be very dynamic.

Monitoring of consumption, it is suggested, could focus on the following four areas. First, there is a need to undertake demand studies for the fast growing major developing country markets, as the sheer speed of economic growth means that consumption patterns may move fairly quickly away from consuming basic grains to diets that are richer in protein and other highly income elastic products. Demand studies may also be needed in the oilseeds sector on changing consumer preferences on the presence of Genetically Modified Organisms (GMOs), products produced using environmentally and socially sustainable practices (palm oil) and product health attributes (e.g. saturated fats and trans fats). These studies can be one-off studies to identify the trends to watch out for.

Secondly, data need to be collected more intensively on the non-food uses of grains and oilseeds: not only on feed use but, importantly, also on the various sectors that use vegetable oils for non-edible and non-feed purposes. Data are simply not available for some of the oilseed end-uses in the chemical industry. Changes in the mix of ingredients both in the animal feed sector and the chemical industry can lead to important changes in demand for the raw materials.

Monitoring the end-use industries with a view toward identifying possible changes in input demand would involve undertaking visits to these industries, subscribing to trade journals and discussing with traders. Possibly, technical reports would need to be commissioned to identify changes.

Thirdly, there has been a strong growth in the use of some cereals and oil-crops for making biofuels, so that currently this use accounts for some 12 percent of world production of coarse grains and close to 10 percent of global vegetable oil production. The surge in the production of maize-based ethanol was prompted by policy measures, especially renewable biofuel blending mandates in transportation fuel, as well as higher petroleum prices. The potential for large changes in that end-use is clearly considerable; the whole industry could shrink rapidly if the policies/fuel prices were to change. This sector will need to be closely

monitored and up-coming legislation followed for clues as to how this demand could evolve. Fourthly, an underappreciated problem in the utilization side of the supply/demand balances is to be found in the unreliability of seeds and waste estimates. The share of a crop used for seed or, more importantly, crop share wasted can be alarmingly high. The Post Harvest Losses Information System shows, for instance, that losses of cereals in East and Southern Africa amounted to 14-17 percent in recent years. The fear is that high figures would also be found in other countries but that information is sparse. There is, therefore, an urgent need for fresh studies for the countries and commodities concerned.

Trade policy changes

World trade in basic food has expanded substantially (i.e. for cereals by over 40 percent between 1990 and 2010), exceeding the growth of world production and consumption (which for cereals expanded by 24 percent and 30 percent respectively over the past two decades) but it continues to vary over time, mainly because of production shocks and changes in consumption. The volume of trade is also influenced by changes in trade policies – witness the decision taken by a number of countries both in 2008 and 2010 to ban exports, which had notable impacts on market sentiment in those years.

Over the past two decades trade policies have increasingly been geared toward market opening by importers and restraint on export subsidies by exporters. Despite the major efforts made in trade liberalization in the period leading up to (as well as in consequence of) the Uruguay Round, by and large, the change in trade policies has been controlled and market opening usually gradual, at least as far as the major trading countries are concerned. For many of the smaller developing country importers, market opening was often more dramatic and food imports surged.

Although this opening helped in increasing trade, it did not cause upsets in the world market. The main causes of disturbances to world food markets in recent years have been production shocks that affect import demand or export supply, which are then reflected in trade policy adjustments. For example, there was a sharp fall in output in the Russian Federation in 2010 that preceded the export ban; the production drop would have caused, in any case, some fall in exports so the net effect of the policy change is less than the headline effect. Still, trade policy, because it acts directly on the world market, often has a psychological effect on markets that needs to be kept in mind. On the other hand, sharp changes in tariffs or export taxes can and do have real and substantial market effects, as can non-tariff barriers and changes in industry standards (e.g. sustainable certified palm oil, labelling for trans fat content). Thus trade policies need to be monitored, including ongoing negotiations under regional and international agreements

Monitoring price developments

Key to any food market monitoring systems is, of course, prices. But it is necessary to be clear about the type of prices involved. The most immediate concern is the current price paid by food industries and eventually consumers and received by traders and farmers. This current price can be measured by wholesale, retail, producer, import or export prices. Essentially all countries have such data, although not necessarily of the same quality in terms of coverage, frequency and representativeness. Looking for indications of prices in a few months or a year ahead there are futures markets in a number of countries where quotations are available

for prices at specific dates and for specific qualities (the Chicago Mercantile Exchange in the United States of America, Euronext LIFFE, as well as those in Argentina, Brazil, China, India, Japan and Malaysia, among others). Price reports, however, are not to be found everywhere; in practice there are relatively few that are open to traders from other countries and which serve as benchmarks for world trade.

Monitoring prices, be they current or futures, is more complicated than meets the eye. There are many varieties and grades of all grains; for rice there are prices for paddy, un-milled rice, polished rice, parboiled rice, graded by percentage of broken rice, long, medium and round grains, aromatic or glutinous varieties, and so on. As far as international prices are concerned, the analyst has to select the most representative and either report these types or prepare price indices, as is now widely done. Using primarily export or import price quotes from specific ports deemed to be representative for world markets, FAO has world price indices for food, rice, oilseeds, oils and oilcakes, dairy and meat products, which are published on monthly basis.[8] Other agencies also construct food/agricultural-related price indices[9] not only because of the heterogeneity of most products but also because prices are often not quoted at certain times of the year or, in particular, when supplies are short. But, in this area, it appears that price monitoring, as currently undertaken, is adequate. The same cannot be said for national domestic price series, where in spite of recent efforts by FAO, improved coverage could be important, especially in the major trading countries.[10] However, because price data are not always of the desired quality, some special efforts may be necessary to improve the flow by engaging local consultants and strengthening local capacity.

Futures prices are structured to refer to a particular date ahead; the length of time ahead that a particular contract refers to gradually shrinks with every day that passes until the contract period closes. The standard view is that the futures price converges on the spot price even though, for technical reasons, the two prices are not equal (the basis). If the classical view is correct, the futures contract typically has to be priced somewhat below the price that the market is expecting (so called normal backwardation), so that the investor in futures contracts can make a gain for the risk being taken. For these two reasons the relation between the futures price and spot prices in the future is not one-to-one. The situation is more complicated when there are next to no stocks in the market in the period when the futures contract is open. In these circumstances, the link between current spot prices and futures prices breaks down and arbitrage[11] over time is ruled out. In other words, while futures prices are a useful pointer to the prices in a few months time, they have to be used carefully.

In recent years, concerns have grown about the influx of investment in the big internationally-orientated futures exchanges by non-commercial interests like banks and hedge funds. The importance of this phenomenon can be gauged by comparing two situations, one without non-commercial interests and another when new buyers for futures enter the market. In the first case, the sellers in the market are basically farmers and the buyers are basically food and feed industries (ignoring foreign trade). Farmers sell forward their future output at a price that they can accept and the industry receives a price at which

8 Reported regularly on: http://www.fao.org/worldfoodsituation/FoodPricesIndex/en/

9 Such as the S&P GSCI Agriculture Index or Thomson Reuters/Jefferies CRB Global Agriculture Equity Index.

10 Nearly 1 000 price series in 77 countries are produced by FAO-GIEWS and made available at: http://www.fao.org/giews/pricetool/.

11 Arbitrage is the practice of buying or selling when a price difference between two markets is greater than the cost of undertaking the trade (e.g. transport or storage costs).

they can do business. Both "lock-in" the price. The stockists undertake time arbitrage so that the difference between spot and futures price is close to the cost of storage plus a "normal" profit margin. When there is an influx of investment from outside the sector, the demand for futures contracts rises and, through time, arbitrage may raise the spot price. With all the caveats mentioned above, it is clear that an influx of money from outside the commercial sector will raise both spot and futures prices; should such investments leave the market both spot and futures prices will fall. This statistic – the net long position of non-commercial operators – is a useful indicator of market sentiment and should be monitored. Some information and analysis in this regard is included in FAO's Food Outlook reports twice a year along with regular assessment of food import bills and implied volatility, but more frequent and detailed analysis are required in order to enhance transparency and market information.[12] Moreover, other indicators should be developed and a special study should be commissioned to develop such indicators.

Conclusions and the way forward

Improved monitoring must be disseminated if it is to play its role in enhancing market transparency. There is a need for both timeliness and frequency of the outputs. The case can be made that the FAO should issue regular short updating documents to Food Outlook, as it did in earlier years. Regular publication of the supply/demand situation in tabular form, perhaps accompanying price updates and selected number of market indicators, may also be helpful. The important guide for an FAO publication is that the outputs are seen as dependable and independent of special interests. To be timely, however, some risks must be taken and judgements on complex unfolding situations may occasionally err. There is no way of completely avoiding errors or wrong judgments, but an annual, short review of forecasts analysing the performance should also be made available to readers. In addition, we suggest that the monitoring reports of policy developments indicated above be released not only because they are useful on their own, but because they can help other analysts understand the basis of FAO forecasts.

One question that has been left aside is the commodity coverage of the enhanced monitoring. Cereals and oilseeds, oils and oilcakes are discussed above, but it would be desirable to extend this monitoring to include the complex but important group of livestock products in view of their significance to world food trade and food security everywhere. Markets for these products are large and have received a boost from trade liberalization. Livestock products are, however, complicated because they are so heterogeneous, even more so than oilseeds, oils and oilcakes. Price data are often poor and, hence, the use of indices is virtually obligatory. In addition, there is the difference between systems of intensive livestock feeding and feeding on pasture. Monitoring pasture conditions is a weak point in this area and further work is needed.[13]

[12] See the Market Indicator section in Food Outlook reports at: http://www.fao.org/giews/english/fo/index.htm

[13] At the moment, the monitoring of world food markets organizationally in the FAO is undertaken in the Trade and Markets Division (EST) by a group of food market analysts who work on world markets and prices. The group collaborates closely with the GIEWS, which monitors the situation in all countries from a food security angle. Together, these two groups maintain current season food balance sheets for all countries. Collaboration is close with the Statistics Division (ESS), which maintains the historical database for agriculture on a calendar year basis. The market analysts draw on a myriad of private and public sources and contacts to obtain the information needed for their analyses; they sometimes also draw on technical advice regarding agricultural issues (pests, agricultural inputs, land and water questions) from the FAO's Agriculture Department. They also rely on information flows from the Regional Offices and country representatives.

This review of methods to enhance the monitoring of the world food outlook suggests the following recommended approaches:

1. Improve the forecasts of countries that are the main market movers rather than attempting to improve forecasts for all countries simultaneously.
2. Rely mainly on tapping the expertise of private traders, farmers, national officials and media sources rather than relying on model building, except for attempts to improve forecasts of area planted, which may prove useful.
3. Place emphasis on analysing policy changes and technical developments, as these give an early warning of supply/demand changes at a later date.
4. Increase the frequency and timeliness of publications while keeping them short.
5. Develop and monitor market indicators, including the net long position of non-commercial operators in futures markets.
6. Arrange for regular exchange of forecasts with the private trade as well as with other international agencies and other experts.

References

FAO 2004. *Critical review of China's cereal supply and demand and implications for world markets, CCP:GR-RI/04/2*, Rome.

——— 2010. *Final report of the extraordinary Joint Intersessional Meeting of the Intergovernmental Group (IGG) on Grains and the Intergovernmental Group on Rice, 24 September,* Rome.

Financial Times 2010a. *Food supply woes fatten Cargill earnings,* 13 January.

——— 2010b. *Price limits could help to avert "flash crash" havoc,* 21 October.