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# COMMITTEE ON COMMODITY PROBLEMS

## Seventieth Session

Rome, 7-9 October 2014

## FOOD STOCKS AND PRICE VOLATILITY

### Executive Summary

The document discusses the issues surrounding food stocks and prices, the extent to which stocks can be used to reduce price volatility and stabilize markets and the related practical and institutional aspects that need to be addressed.

### Action sought from the Committee

- The Committee is invited to review the information provided in this document and supplement it with evidence from national and regional experiences.
- The Committee is also invited to advise on the need for further work on stocks and price volatility and on institutional approaches for effective use of stocks to improve price and market stability.

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## I. INTRODUCTION

1. The recent experience of three food price spikes in five years highlighted the vulnerability of international markets to supply and demand shocks when stock-to-use ratios are low. The resulting “excessive” price volatility was associated with lower stock levels that were not “adequate” to cushion the impact of shocks, although defining “excessive” and “adequate” is not easy and reliable stocks data are scarce. In the last few months, recovering production and stock levels have calmed markets.

2. These developments have focused analytical attention on the relationship between stocks and prices and on low stocks as a necessary condition for spiking prices. They have also revived interest in the question as to whether active manipulation of stocks at national, regional and even international levels might be used to stabilize prices or at least limit price spikes.

3. This paper reviews these issues in the light of the questions raised by the *FAO Expert Meeting on Stocks, Markets and Stability* held at FAO headquarters, Rome, 30-31 January 2014<sup>1</sup>. The Committee is invited to consider the information presented herein and to discuss its policy implications.

## II. POLICY APPROACHES TO ADDRESSING PRICE VOLATILITY

4. The recent food price spikes triggered different national policy responses aimed at either moderating the price increase itself or moderating its negative impacts. Stocks policies have a potential role in each case. While some countries imposed direct controls on prices or margins, efforts to moderate price increases relied mainly on increasing available supplies, especially through trade policy changes which could be implemented quickly and at relatively low direct budgetary cost. Efforts to provide short-term relief from the impacts of price increases relied on scaling up various safety net measures including subsidized food distribution, school feeding programmes or cash transfers. Not all such measures can easily be put in place as an emergency response.

5. The apparent limitations of other approaches led to renewed interest in the policy roles of stocks, whether as emergency reserves to cover temporary shortfalls in supplies or as buffer stocks to stabilize prices or at least limit price spikes<sup>2</sup>. It seems widely recognized that small strategic emergency food reserves can help improve food security. By exploiting synergies with early warning systems and well-designed and well-targeted consumer safety nets, they can reduce the exposure of vulnerable people to price volatility. Many developing countries ran down stocks in 2007-08 to increase availability and maintain food security while stocks lasted, and in some cases this also moderated consumer price increases. However, using public stocks to specifically manage price volatility is more controversial and its effectiveness is uncertain.

6. Nevertheless, there is active debate over the use of stocks not only for emergency purposes but also for price stabilization. Although the two are sometimes difficult to separate, it is the latter which is of concern here and the debate raises questions not only of the practical feasibility of price stabilization through stocks but also broader questions of the appropriate involvement of the public sector in food markets and the relative roles of stocks versus trade in ensuring price stability and food security. More detailed questions concern the role of private stocks and the relationship between private and public stockholding. Managing stocks to influence prices requires a detailed understanding of the relationship between the two to determine appropriate stock releases but it also requires overcoming a variety of financial and operational problems. These issues are explored in the following sections.

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<sup>1</sup> The papers and presentations from this expert meeting are available at [www.fao.org/economic/est/est-events-new/stocks/](http://www.fao.org/economic/est/est-events-new/stocks/)

<sup>2</sup> See, for example, F. Galtier “Which role for storage policies in managing grain price instability? Some insights from a thought experiment”. *FAO Expert Meeting on Stocks, Markets and Stability*. FAO, Rome, 30-31 January 2014.

### III. PUBLIC AND PRIVATE STOCKS

7. The severity of the 2007-08 price spike led many developing countries to reconsider their policy options. Interest grew in the active accumulation of stocks as an element of national or regional food security strategies and as emergency reserves to meet temporary shortfalls in food supplies and to provide some degree of insulation from volatility in world markets. This was in contrast to the trend in developed countries where stocks were typically declining. The possibility of using buffer stocks to curb price volatility at national, regional and even international levels also began to be discussed.

8. Public stocks are procured to counter unexpected shortfalls in food availability or for regular distribution to guarantee food security to the vulnerable more generally and also as buffer stocks to stabilize prices, which is the major concern in this document. Many countries already held stocks for emergency needs and some for price stabilization, notably for rice in Asia. In some countries public procurement programmes also support farm prices and help integrate smallholders into markets. Public stocks in some developed countries also accumulated as a result of policy support to agricultural production but diminished as policy reform progressed. Although accumulated to some extent incidentally, these high stock levels arguably helped restrain price volatility, but stockholding was not widely considered as a practical policy tool to secure market stability. The emphasis was on policy reforms agreed under the Uruguay Round Agreement on Agriculture to remove trade distortions, measures to enhance market transparency, and encouragement of the use of risk management tools and targeted social protection programmes to mitigate the negative impacts of price volatility on the most vulnerable.

9. While the consensus view appears to be that stocks held as emergency reserves can play a useful role, this is less widely accepted in the case of attempts at stabilizing prices through buffer stocks. Nevertheless, there is clearly a strong preference in some countries for food price stability, and those countries are willing to devote significant budgetary resources to preserving it. In practice, the two roles of public stocks overlap since release from food security reserves, which can be sizeable, in response to reduced availability and increasing prices can restrain price increases. However, this is a by-product of the operation of emergency and food security reserves rather than a deliberate attempt to manage stocks to maintain a specific price band or eliminate price spikes. In fact, in 2007-08, some countries were building stocks as prices were rising.

10. In the case of private stocks, these are held by farmers, processors and traders to meet their business needs, or to manage risk, or for financial gain in the expectation of higher prices in the future. Private storage is discussed in more detail in the next section. Stocks can also be held by smallholders and households to smooth their food consumption in the face of erratic supplies and prices. While such stocks may be insignificant individually, they can have an important cumulative impact on prices, as for example, in the case of hoarding and panic buying of rice in 2007-08.<sup>3</sup>

11. In many countries, public and private stocks are held simultaneously and are effectively interchangeable. Governments can provide policy incentives to encourage private storage and its use for public policy objectives as an alternative to public stocks. In the absence of such policy incentives, private storage alone based on private rather than social costs and benefits and risk perceptions would not necessarily be sufficient to meet the government's storage needs. At the same time, public stocks can crowd-out private stock holding.

### IV. THE RELATIONSHIP BETWEEN STOCKS AND PRICES

12. Understanding the relationship between stocks and prices is fundamental to understanding how food markets work and especially what role stocks might play in policy interventions in relation to price spikes and volatility. Even where stocks are maintained for emergency relief purposes, the potential impacts of stock releases on markets and prices need to be assessed. The relationship

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<sup>3</sup> P. Timmer "What are grain reserves worth? A generalized political economy framework". *FAO Expert Meeting on Stocks, Markets and Stability*. FAO, Rome, 30-31 January 2014.

between stocks and prices might also provide the basis for a practical indicator for heightened risk of price volatility, namely movements in the stocks-to-utilization ratio (SUR).<sup>4</sup>

13. The High Level Panel of Experts of the Committee on World Food Security (CFS) noted “*The relationship between stock levels and price volatility is well-established: low stocks are strongly associated with price spikes and volatility*” and that a minimum level of stocks seems to be a sufficient condition to avoid price spikes.<sup>5</sup> It is true that recent price spikes have been associated with low stocks, or more precisely low stocks-to-utilization ratio (SUR) but not in every case, and economists’ opinions are still divided on how important the role of stocks was in the 2007-08 spike and afterwards. In the case of rice in 2007-8, for example, rice stocks were actually increasing as prices were increasing. Stocks provide a cushion against supply or demand shocks and there are many instances of major production shocks having little impact on prices as a result. Low stocks are a necessary but not sufficient condition for such shocks to produce a spike, so stocks provide only a partial explanation for price changes.<sup>6</sup>

14. Depending on the balance between current demand and production, stocks can represent either additional demand or additional supply, with the carry-out stocks linking production periods and prices. If storers “buy low to sell high” then stocks smooth out price variations: low current prices relative to expected prices provide incentives to stock holding which in turn raises prices until the return to stock holding is the same as the return on similarly risky investments. High prices result in destocking. Once stocks are exhausted – a “stockout” – then prices are determined by current demand and supply and a continuing shortfall in supply has to be offset by adjustments to trade or different consumption categories.

15. The “supply of storage model” provides the standard economists’ view on the relationship between private stocks and prices. This says that carry-out stocks are based on expected prices and so on expectations concerning future supplies and demand. If prices are expected to increase then higher stocks will be held. Price expectations will be formed on the basis of information concerning past price changes, general commodity price movements and macroeconomic variables such as growth, inflation and exchange rates. The supply of storage model predicts that price peaks will coincide with low stocks-to-utilization ratios. Storers add to private stocks until current price plus costs of storage equals expected value of price next year. This gives an L-shaped stocks demand function showing the relationship between stocks-to-utilization ratios and prices: stocks demand is highly elastic where supplies are plentiful and prices low then becomes increasingly inelastic as supplies are low and prices high.

16. So there is a relationship between stocks and prices which suggests that private stocks have a stabilizing role. Stocks set a price floor where private agents expect prices to be. Prices and stocks are determined simultaneously while public stocks are essentially exogenously determined by governments. While stocks can moderate the extent of periodic spikes, a sequence of poor harvests or other supply shocks raise the risk of stockouts. Through trade, these national private stocks can contribute to stabilizing international markets. From an international perspective, therefore, it is particularly the level of stocks in major exporting countries such as the United States rather than

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<sup>4</sup>E. Bobenrieth, B. Wright, and D. Zeng “Stocks-to-use ratios and prices as indicators of vulnerability to spikes in global cereal markets”. Paper prepared for the 2nd Session of the Global Food Market Information Group of the Agricultural Market Information System (AMIS), 3 October 2012. Available at [http://www.amis-outlook.org/fileadmin/user\\_upload/amis/docs/reports/AMIS\\_IG\\_12\\_4\\_Stock\\_to\\_use.pdf](http://www.amis-outlook.org/fileadmin/user_upload/amis/docs/reports/AMIS_IG_12_4_Stock_to_use.pdf)

<sup>5</sup>CFS High Level Panel of Experts on Food Security and Nutrition ‘Price Volatility and Food Security’, July 2011, p12

<sup>6</sup>C. Gilbert “Grain stocks and prices”. *FAO Expert Meeting on Stocks, Markets and Stability*. FAO, Rome, 30-31 January 2014

global stocks *per se* that are most relevant. However, some countries have public stocks for domestic food security and ring-fenced from trade, in which case there is no beneficial effect on world markets.

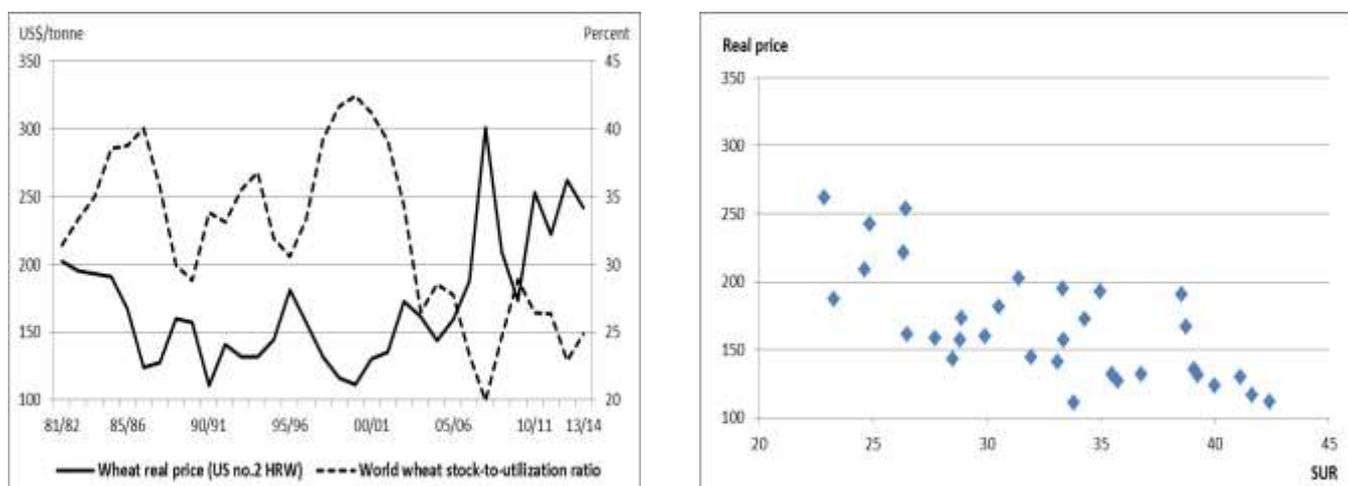
17. The relevant relationship between stocks and prices may involve different commodities where there are substitution possibilities. In the case of a production shortfall in one crop, stocks of that crop are drawn down and through substitution eventually stocks of related crops, so production shortfalls for an individual crop do not necessarily lead to a price spike if there are substitution possibilities.

18. For policy decision-making, the qualitative relationships outlined above need empirical support. Unfortunately, stocks data are typically weak and in many cases non-existent. Improving stocks data was an important reason for the creation of the *Agricultural Market Information System* (AMIS). Public stocks should be measurable, although data are not always made public and are a state secret in some countries.

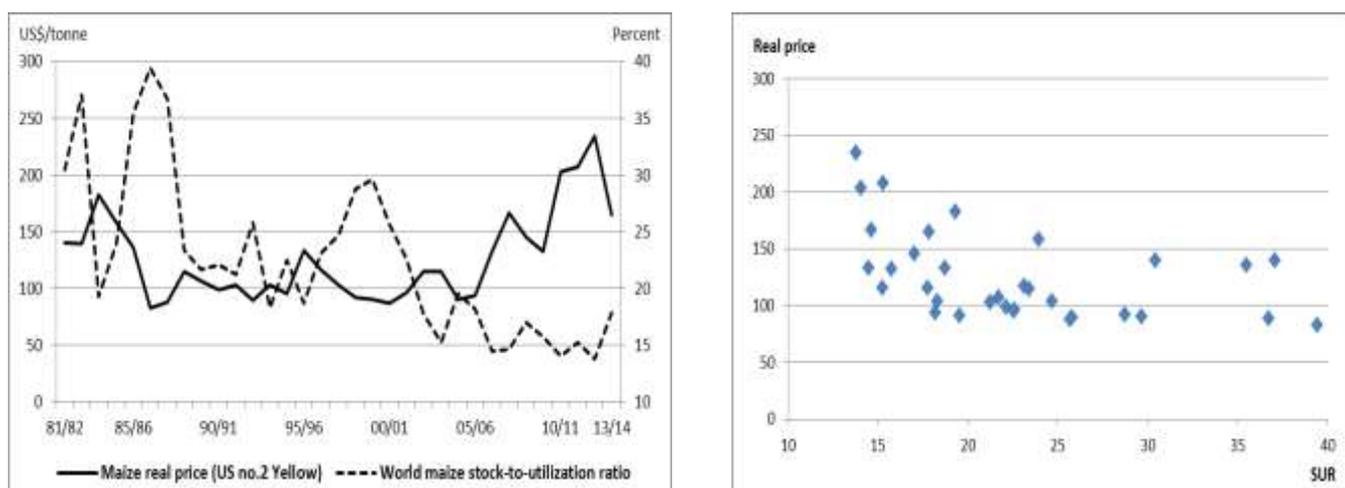
19. In general, stocks data are estimated as a residual after accounting for all the other variables – production, utilization, imports and exports – in a supply-demand balance. Production and trade data are measured most accurately but the various categories of use – food, feed, industrial use, seed, waste and losses – less so. Food consumption surveys can provide estimates of food use but the other categories are often estimated as a proportion of production. Any errors in estimating these variables accumulate in the stocks estimate so it is important that the coefficients used to estimate different categories of use are regularly updated and empirically verified. Only a few countries – Brazil, Canada, the Philippines, and the United States – conduct regular stocks surveys covering stocks held by different market participants.

20. In spite of these data limitations, Figures 1-3 confirm the broad relationship between stock-to-utilization ratios and prices for cereals. The time series graphs show the coincidence of high prices and low stock-to-utilization ratios, although not in every instance. The scatter graphs suggest the downward-sloping stocks demand function, although the picture for rice and especially after 2000 is less clear.

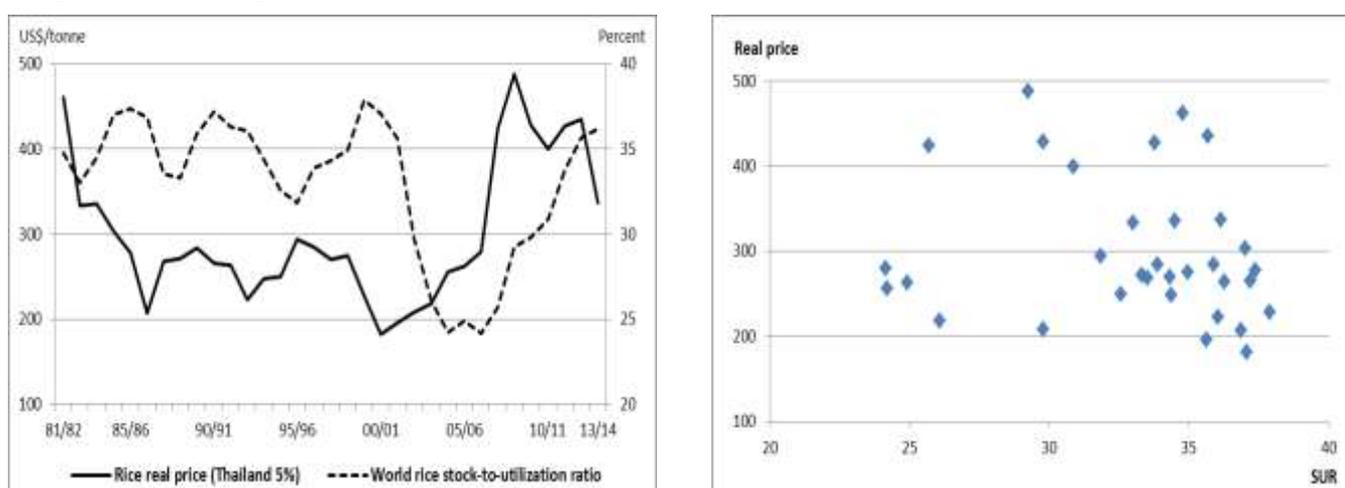
**Figure 1. Wheat real price and stock-to-utilization ratio, 1981/82-2013/14**



**Figure 2. Maize real price and stock-to-utilization ratio, 1981/82-2013/14**



**Figure 3. Rice real price and stock-to-utilization ratio, 1981/82-2013/14**



21. Econometric analyses estimate the relationship between prices and stocks-to-utilization ratios where prices are real market or future prices at end-year. The results are mixed depending on the time period considered, with the apparent relationship between stocks and prices not always statistically well-defined especially after 2000/01.<sup>7</sup> This is partly due to the data limitations but also due to shifts in the relationship itself. Where long data series are used it is difficult to establish a stable estimated relationship as a result of policy changes and the shifting balance between public and private stocks – which have different relationships with price – in total estimated stocks.

22. The estimated relationship between prices and an aggregate cereal stocks variable tends to perform better statistically with price movements for wheat, maize and rice more closely correlated to movements in the aggregate stocks-to-utilization ratio than to stocks-to-utilization ratios for individual cereals. However, overall, the estimated links between prices and stocks are stronger than those between prices and production. While the econometric estimates may not provide a precise and stable empirical model, they do provide broad support for the predictions of the supply of storage model.

<sup>7</sup> See, for example C. Gilbert “Grain stocks and prices”. *FAO Expert Meeting on Stocks, Markets and Stability*. FAO, Rome, 30-31 January 2014.

## V. EXPLOITING THE RELATIONSHIP BETWEEN STOCKS AND PRICES

23. Private stocks can have a role in contributing to stability including in global markets where stocks and trade are related. In principle, and provided that a stable empirical relationship between stocks and prices can be established, this might be exploited by policies to stabilize prices or limit price spikes. The argument that private storage alone would not provide sufficient stocks in relation to these objectives suggests a need for policy incentives to encourage private stockholding and/or a role for public stocks.

24. Buffer stocks are used in a number of developing countries, though they have been virtually abandoned in developed countries. There already were a number of operating schemes either at national or regional level before 2007-08, notably for rice in Asia<sup>8</sup>, and there have been proposals for new schemes since. However, a recent World Bank review of national and regional experiences<sup>9</sup> concluded that while public stocks could contribute to addressing short-term emergency needs they have not been an effective instrument to stabilize prices. Similarly, the international organizations' 2011 report to the G20<sup>10</sup> rejected the use of buffer stocks to stabilize prices as costly and ineffective, although it did see a role for small-scale food security emergency reserves to assist the most vulnerable. On the other hand, the CFS HLPE report<sup>11</sup> suggested that governments might come together to organize minimum storage levels and called for "*practical organization of a minimum level of world stocks*" with the objective not of defending a price band but to avoid spikes. In practice, many of the same issues arise with respect to either objective.

25. There are concerns on grounds of cost but also on operational issues and effectiveness. The investment costs of establishing a buffer stock and the costs of market operations are significant, putting such schemes beyond the reach of many developing countries, although some savings might conceivably be achieved where a regional scheme is based on coordination of existing stocks.

26. Continuing budgetary costs of market operations and trading losses incurred can also be significant and can be difficult to control where borders are open. Operational problems include physical losses to stocks as a result of poor storage practices, the possibility of unpredictable or untransparent rotation decisions having unintended impacts on prices, and the difficulty of judging the need for interventions and their timing so that the interventions themselves are not destabilizing or adding to market uncertainty and deterring investment. In some instances replenishment policies of public stock holdings have not bought cheap to sell dear but rather bought when prices are high contrary to the normal view of stocking strategies and adding to pressure on prices. Some stockholding arrangements might be seen as trade-distorting support under the existing WTO rules. Public buffer stocks can crowd out private storage and private trade, especially where public procurement is not transparent and open.

27. The World Bank review concluded that, in general, attempts to stabilize prices using stocks have resulted in failure or have involved costs far in excess of their benefits and absorbed resources better used elsewhere. Confusion of objectives between price stabilization and emergency relief and between the needs of producers and consumers leads to widening gap between buying and selling prices, conflicting decision rules on accumulation and release, slow reactions and escalating fiscal costs as larger and larger stocks are required to meet all objectives. These costs can amount to as much as two percent of GDP and are often about the same or more than spending on agricultural research.

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<sup>8</sup> R. Briones "Public stockholding in Southeast Asia: Review and Prospects". *FAO Expert Meeting on Stocks, Markets and Stability*. FAO, Rome, 30-31 January 2014.

<sup>9</sup> World Bank, *Using Public Foodgrains Stocks to Enhance Food Security*, 2012.

<sup>10</sup> FAO, IFAD, IMF, OECD, UNCTAD, WFP, the World Bank, the WTO, IFPRI and the UN HLTTF *Price Volatility in Food and Agricultural Markets: Policy Responses*, Report to the G20, June 2011.

<sup>11</sup> CFS High Level Panel of Experts on Food Security and Nutrition 'Price Volatility and Food Security', July 2011

28. Some countries, especially in Africa, using buffer stocks have failed to achieve price stability and prices have been more volatile than international prices or prices in neighbouring countries without buffer stocks. Wide gaps between export and import parity prices because of poor infrastructure and wide marketing margins allow prices to fluctuate widely without triggering imports or exports, and it is better to address that problem and low productivity and resilience more generally than to try to compensate through expensive buffer stocks.

29. Attempts to stabilize prices through regional and international buffer stocks face many of the same difficulties with the added complication of differing national interests, potentially leading to collective action issues and tensions in governance. Besides the regular operational matters, joint decisions are required on when price increases justify action and what that action should be. These proved problematic in the case of the international commodity agreements. International buffer stock mechanisms are judged to have been ineffective in reducing the volatility of prices although the experience is actually quite limited. Of the five international commodity agreements which provided for stockholding or supply controls to stabilise prices, only one – the agreement for rubber – was a pure buffer stock. The agreements were more effective in moderating downward price movements than price spikes which a buffer stock can only curb while it still has accumulated stocks.

30. The relevance of the international commodity agreement experience to moderating price spikes today might be questioned. However, many operational decision-making and financial issues would remain the same. Stabilising world prices in the face of a sequence of production shocks around a level lower than that determined by market fundamentals requires significant resources. The typical behavior of commodity prices with long low-price periods and occasional spikes mean that stocks might need to be held for long periods. Buffer stocks set to defend against price spikes are also vulnerable to speculative attacks. If speculators perceive that the stocks held by the stabilization agency are insufficient to maintain the target lower price level, they will compete to buy the entirety of the stock in order to take advantage of likely profits.

## VI. CONCLUSIONS AND QUESTIONS FOR DISCUSSION

31. In spite of the limitations of available stocks data and the consequent difficulties of establishing a stable empirical model, it is apparent that low stocks are a necessary condition for price spikes and that the relationship between prices and stocks is highly relevant to policy on price volatility. Many countries have used stocks policies in attempts to limit price spikes and there have also been attempts at regional and international level. However, it seems that these have been with limited success and at high cost.

Members are invited to comment on their own countries' experiences in implementing such policies and to consider the policy implications of the information presented here. There are a number of key questions that might be addressed:

- On private storage, while this has an important stabilizing role it may be underprovided in which case what are the most effective policy incentives to encourage greater private storage?
- What should be the roles of public stockholding policies compared to alternative policies that address the underlying causes of price spikes and volatility?
- If public stocks are held simultaneously with private, how can they be coordinated to avoid crowding out of private stocks?
- How could public stocks be managed in relation to price spikes to avoid risk of further destabilizing prices and markets?
- If there is a case for public stocks to be used as buffer stocks then what would be the necessary institutional and organizational arrangements to operate them effectively and efficiently?

32. The Committee may wish to reflect on the case for, and the feasibility of, international cooperation to manage international stocks to achieve price stability on world markets.

33. The Committee may also wish to provide guidance as regards the need for further work on stocks and price volatility and on institutional approaches for effective use of stocks, both public and private, to improve price stability.