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FACTORS AFFECTING RECENT AND FUTURE PRICE VOLATILITY OF FOOD COMMODITIES

*Alexander Sarris**

1 Introduction

The sudden and unpredictable large increases (spikes) of many internationally traded food commodity prices in late 2007 and early 2008 caught all market participants, as well as governments by surprise and led to many short term policy reactions that may have worsened the price rises. Many governments, think tanks, and individual analysts called for improved international mechanisms to prevent and/or manage sudden food price rises. Similar calls for improved disciplines of markets were made during almost all previous market price bursts, but were largely abandoned after the spikes passed. The financial crisis that started to unravel in 2008, has coincided with sharp commodity price declines, and food commodities have followed this general trend. The price volatility has been considerable. For instance, in February 2008, international wheat, maize and rice price indices stood higher than the same prices in November 2007, namely only three months earlier, by 48.8, 28.3, and 23.5 percent respectively. In November 2008, the same indices stood at -31.9, -3.2, and 52.3 percent higher respectively, compared to November 2008. In other words within one year these food commodity prices had increased very sharply in the first part of the year, and subsequently declined (except rice) equally sharply. Clearly such volatilities of world prices creates much uncertainty of all market participants, and makes both short and longer term planning very difficult for all. Hence, it is useful to think behind the reasons that caused the recent price spikes and subsequent declines, as well the general food commodity market volatility. The purpose of this paper is to examine the price volatility of basic food commodities in perspective, and to isolate the factors that contribute to this volatility with a view to assessing the market volatility prospects in the future.

Market volatility or instability refers to period to period changes in indicative summary market variables (such as prices). Such instability is due to unpredictable changes in the market fundamentals (such as production costs and volumes, demand, government policies, macroeconomic factors, etc.) which change the perceptions of market participants about the current and future values of the commodity, and is a normal phenomenon of all agricultural markets. To deal with market instability and spikes one must first comprehend the forces that determine market volatility and unpredictability and market participants' behavior under unpredictability.

In the food commodity markets there have been four periods of sudden price increases (and subsequent declines), before the most recent one, in the last forty years (1973-75, 1978-79, 1986-87, and 1995), albeit only the one of 1973-75 was of comparable magnitude to the recent one. Recently (as of the summer 2008), international food commodity prices have declined sharply and unpredictably from their peaks of early 2008. How can one interpret these sharp food commodity price swings, and is the recent one unique?

There have been many analyses of the recent food price surges (ABBOTT, et. al. 2008; BALTZER et. al. 2008; HELBLING et. al. 2008; SCHNEPF; 2008, TROSTLE, 2008; VON BAUN et. al., 2008; MITCHELL, 2008. Recently HEADEY and FAN, 2008 made an assessment of all the various explanations and factors that have been proposed to explain the food price surge of

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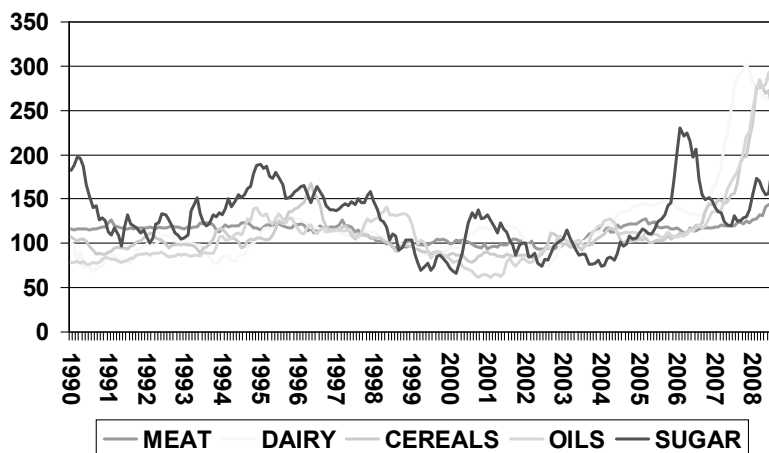
late 2007 and 2008, and found that among the many factors proposed only a few are consistent with the underlying facts of the crisis. However, market volatility is not only about a single event of sharply rising commodity prices. It is about a continuing pattern of unpredictable changes in prices, both positive and negative. It is this unpredictability that affects medium and long term investments and hence patterns of production, but also consumption.

The plan of the paper is as follows. First a brief overview of recent and past food commodity price developments is given. Next the various causes of the recent food commodity market are assessed in light of their potential to cause the sudden spikes. Subsequently I discuss the factors that determine commodity price volatility, in order to assess the medium term prospects for continued food commodity market volatility.

2 Trends and factors underlying recent commodity price developments.

Figure 1 indicates the evolution of monthly nominal international prices (index form) of the main traded food commodities since 1990. It can be seen that the main commodities that have soared in late 2007 and early 2008 were dairy, cereals and oils, while sugar and meat prices do not appear to have spiked in any exceptional way, given the trends since 1990. Similarly (and not shown), other agricultural commodities such as the tropical beverages coffee and cocoa, have not exhibited any marked price changes in 2007 and 2008, compared to the 1990-2006 patterns.

Figure 1: Recent basic food commodity international price indices (1998-2000=100)

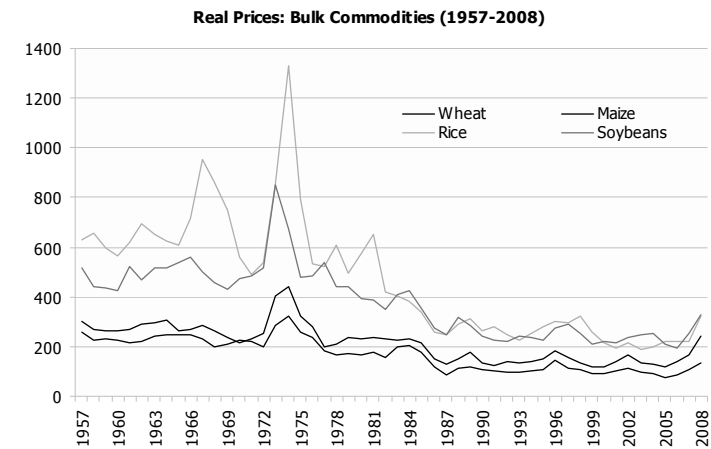


Source: FAO Trade and Markets Division

While, however, the world price changes in some of the basic food commodities appear significant in nominal terms in relation to the trends of the past twenty years, when examined in real terms, prices during the recent crisis appear still considerably smaller compared to the peaks during the previous major food crisis of the mid-1970s. Figures 2-4 indicate the real international prices (deflated by the US producer price index) of the main cereals, oilseeds, oils, and meats from 1957 to 2008. It can be readily seen that for all commodities indicated,

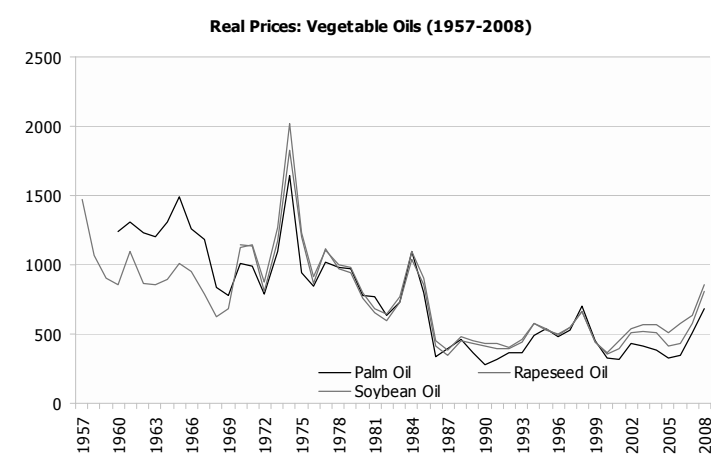
the real prices at the height of the crisis in 2008 were considerably lower compared to the real prices in the mid 1970s.

Figure 2: Real prices of bulk food commodities 1957-2008



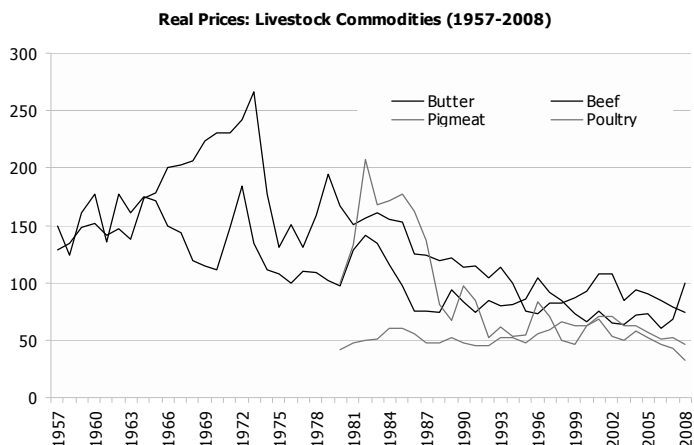
Source: FAO Trade and Markets Division

Figure 3: Real prices of vegetable oils 1957-2008



Source: FAO Trade and Markets Division

Figure 4: Real prices of livestock commodities 1957-2008



Source: FAO Trade and Markets Division

Another salient pattern evident in the graphs of figures 2-4 is that the long term decline in food commodity prices, that appears to have been in place since the late 1950s, seems to have stopped in the late 1980s and early 1990s, with the trend lines indicating steady, albeit still fluctuating patterns. In fact for some of the exhibited commodities there appears to be even a slight upward real price trend in the last twenty years (eg for the vegetable oils). This suggests that there may have been several slowly evolving factors affecting global food markets that gradually created a situation of tightly balanced supply and demand, where a spike was almost inevitable in response to small shocks. Several of these factors have been discussed and analyzed by many authors and think tanks, as well as FAO. They include the following.

1. Growing world demand for basic food commodities, due to growth in emerging economies, such as China and India. This development has been touted considerably by many observers, but in fact it has been occurring gradually for several years, and cannot account for the sudden price spikes. Furthermore, the rate of growth of these countries' demand or utilization of cereals, the most widely consumed and traded food commodities, for food, feed and other non-biofuel uses, has been decreasing rather than increasing. In fact this is compatible and predicted by conventional economic wisdom, which indicates that as incomes rise, the demand for basic foods rises by less than the rise in incomes.
2. Demand of cereals for biofuel production. It is true that a significant amount of production of maize in the USA, oilseeds in the European Union, and sugar in Brazil have been utilized for biofuel production, often with help from a variety of support policies and mandated alternative energy targets. This has also been occurring over a number of recent years, and accounts for a significant portion of market demand for these commodities, as well as, via substitution, for indirect demand for several other commodities that compete for the same resources, such as land. As this has been occurring for some time, and helped keep prices increasing and strong overall, it is unlikely to have been a major factor for the sudden price spikes, albeit it may have had amplifying effects in an already tight market.

3. The rise in petroleum prices. Petroleum prices started rising in 2004, and continued rising all throughout the past few years, before sharply declining in late 2008. The reasons are largely demand by fast growing countries with energy intensive economies, such as China and India. The oil price increase, apart from pushing costs of agricultural production and transport higher, induced a demand for alternative fuels, which in the context of the rising awareness about climate change created a strong demand for biofuels. This, in turn, translated to increasing demand for agricultural raw material feed stocks for biofuel production. Oil price increases accelerated starting in late 2007 and continued increasing rapidly until August 2008 when they started a rapid decline. Food commodity prices, especially those for biofuel stocks, seem to have followed this trend quite closely, including through the spike period of late 2007-2008 and hence one might induce that there is a close link between oil prices and food prices, that may have been one of the main contributing factors to the recent food price spike and subsequent decline.
4. Slowing rates of increases in farm productivity. During the more than thirty years since the last major food price crisis of 1973-75, agricultural prices in real terms have been declining due to fast rates of growth of agricultural productivity (both land productivity as well as total factor productivity). In the more recent period, agriculture has been neglected in most developing countries, as the World Bank's 2008 World Development Report aptly illustrated. The neglect not only involved lower productivity growth, via lower investments, but also the perception that agricultural supplies were not a problem in a world of low prices.
5. The gradual decline in global food commodity stocks. The ratio of end of season world cereal stocks to global utilization appears to have decreased considerably between 1990 and 2008. For two of the major cereal commodities (maize and rice) this decline can be accounted for by the decline in the stocks of China. Furthermore, globalization that linked markets much more and saw the proliferation of "just in time" production methods, may have had the effect of reducing the overall level of global food commodity stocks. Excluding China, world cereal stock ratios for most cereal commodities (except wheat) have not changed appreciably in the last 20 years. Nevertheless, several major cereal producing and trading countries experienced secular declines in end of season stocks. Irrespective of the source of the decline, however, it is a fact that when commodity markets face lower end of season stocks, they react much stronger to any negative shocks.
6. Commodity speculation. This factor has been highlighted by many analysts and politicians, to the point of blaming the organized commodity exchanges for the price spikes. Speculation is an ordinary fact of life in all commodity markets, and is a necessary ingredient of all commodity trade. Any agent who buys a contract for commodity (in the physical or future markets) with the intention of selling it later for a profit can be considered a speculator. Organized commodity exchanges are important institutions for both market transparency as well as the transfer of market risk from physical markets to speculators, and they guarantee transactions via the underlying clearing houses. It is no coincidence that they have evolved and grown over a period of more than two centuries, as they have been perceived as important institutions for managing market risks. The advent of large investments by commodity funds in recent years has raised new issues about the utility of the organized exchanges as risk transfer mechanisms, and about the role of unfettered speculation in persistent price rises. Detailed analyses of recent events (GILBERT, 2009) have suggested that there is weak evidence that such investments have contributed to the commodity price boom.

7. Macroeconomic factors. While most commodity market analysts look for commodity specific fundamental factors to explain individual commodity price spikes, there are systemic macroeconomic factors that affect all commodities that have been very influential. The recent commodity boom has involved most traded commodities and not only agricultural ones. One of the key factors that fueled such a boom seems to have been a period of easy money and loose regulation of financial transactions, which resulted in a fast expansion of global financial liquidity, a weak US dollar, and low interest rates. It is notable that the previous large commodity boom of 1973-75 was also preceded by a period of expanding global liquidity fueled by large US external deficits and loose monetary policies, much like in recent years. It has been shown by research (ABBOTT, et. al. 2008, MITCHELL, 2008) that US dollar depreciation has contributed around 20 percent to increases in food prices. FRANKEL (2008), in turn, has made the argument that low interest rates, themselves induced by monetary expansion, encourages portfolio shift into commodities, and also discourages stockholding, therefore, contributing to commodity price rises. Given that the commodity boom of early 2008 came to an abrupt stop in late 2008, followed by subsequent strong price declines, in the wake of the global financial crisis, without substantial changes in the underlying commodity market fundamentals, suggests that macroeconomic factors were important in the recent boom.

The important point to highlight is that most of these factors were slow in developing over several years, but cumulatively they created a situation of tightly balanced world supply and demand for many agricultural commodities. Furthermore, they made the demand for the agricultural commodities very price inelastic. The demand curve for agricultural (and other commodities) is price elastic when there are ample supplies (from both production and stocks) but becomes very inelastic when the overall supplies are small. As indicated above both the reduction of global stocks, as well as the macro factors that fuelled demand growth, pushed the supply demand balance of most food agricultural commodities in a territory, where small shocks or small changes in perceptions could have had very strong price effects. In fact the food production shocks that happened were small, exemplified by the fact that global grain production declined by only 1.3 percent in 2006, but then increased by 4.7 percent in 2007, and a further 4.8 percent in 2008, despite the fact that some of the major exporting countries such as Australia experienced very sharp negative production shocks (of the order of 50-60 percent in both 2005 and 2006). Such production shocks are rather normal in global food commodity markets, and have occurred on similar scale several times in the past, without causing price spikes. It then appears that production shocks were not the main factor driving the commodity markets, but rather some of the other factors indicated above.

A factor that seemed to have contributed considerably to the recent short term price spikes is hoarding tendencies and policies affecting the normal flow of commodities. It is well known that the reaction of many private agents as well as governments at the onset of price rises was destabilizing, in the sense that their actions fuelled the demand for current supplies, led by fears of impending basic commodity shortages. In other words when market agents realized that there were inadequate buffers in the global markets to ensure smooth supply flows, they started to behave atomistically, to ensure their own smooth supply flow. This created panic buying and hoarding, even when the underlying conditions did not justify it, thus creating the price spikes. The case of the global rice market is a good case in point, where, despite adequate global production and supplies, uncoordinated government actions, such as export bans, created a short term hoarding panic and an ensuing price spike. The realization in mid-2008 that the situation was not as critical as many thought, led to the opposite effect and a sharp price decline followed.

3 The evolution of market price instability

In the context of the events of the last two years, it is interesting to examine the evolution of world market price volatility. Figure 5 below plots the indices of annualized historic volatilities (estimated by normalized period to period changes of market prices) of nominal international prices of bulk food commodities over the previous five decades. The figures also exhibit the nominal international prices on the basis of which the indices of volatility are determined. The reason for the juxtaposition of the two types of information is to examine visually the relationship between the level of commodity prices and the market volatility. It has been known for along time since Samuelson's classic article (SAMUELSON, 1957) that in periods of price spikes, overall supplies are tight, and market volatility should be higher, hence the expectation is that during periods of price spikes the index of market volatility should exhibit a rise as well.

Figure 5: Historic volatility and nominal international price for the major food commodities

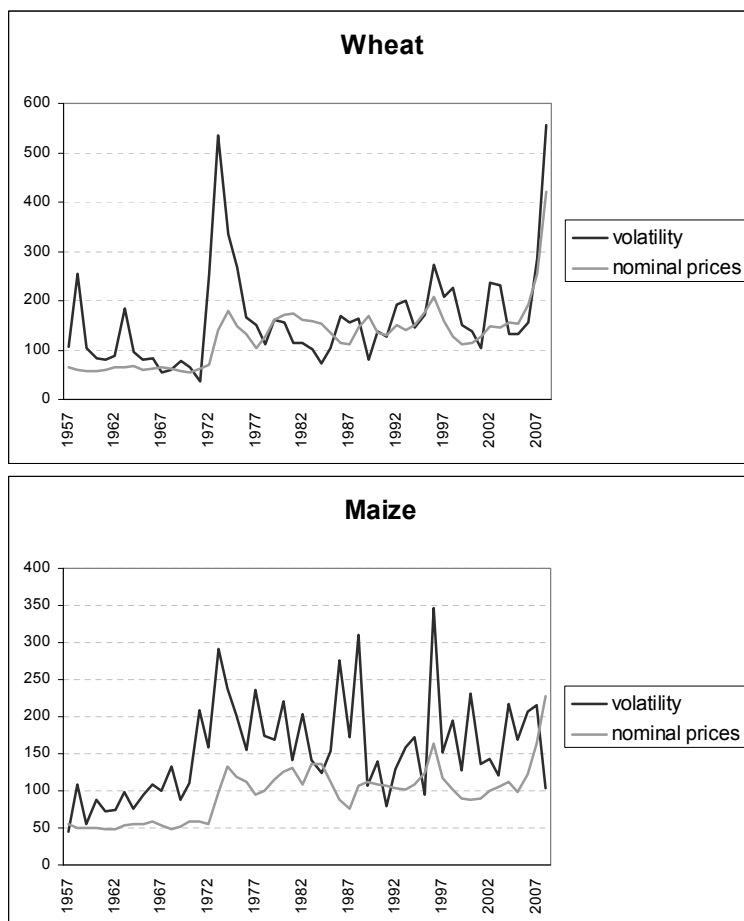


Figure 5 (continued)

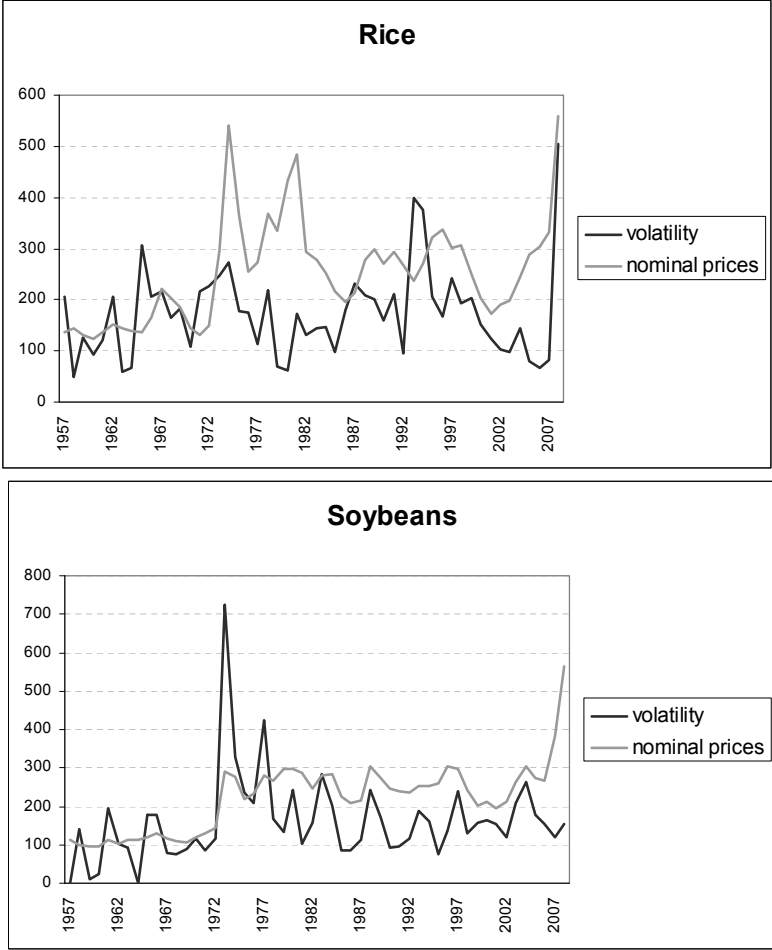
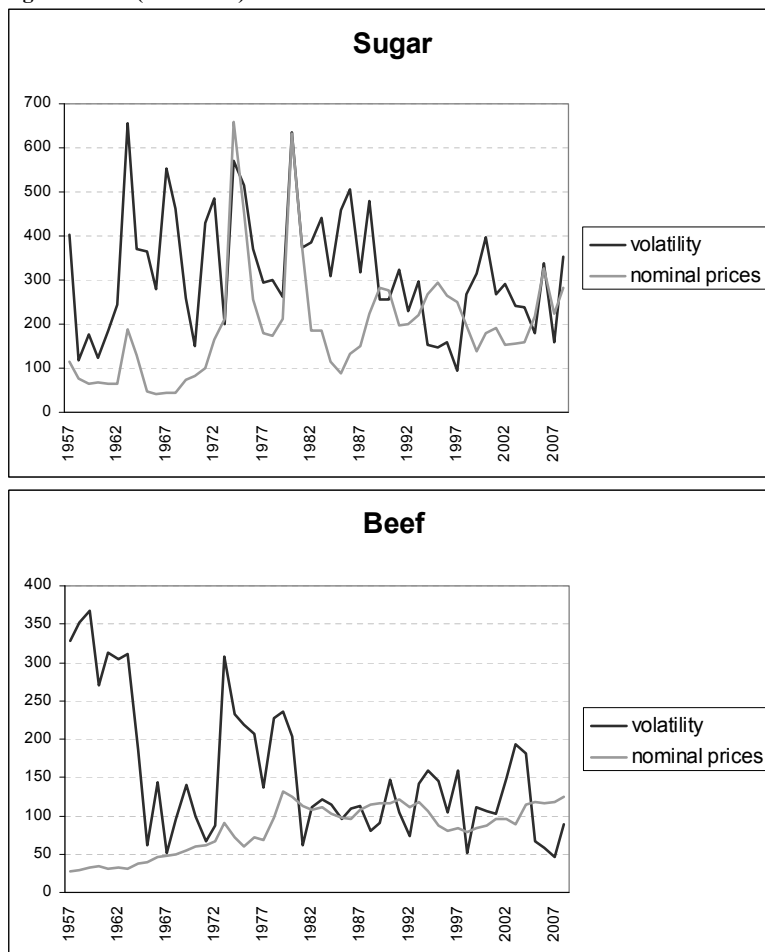


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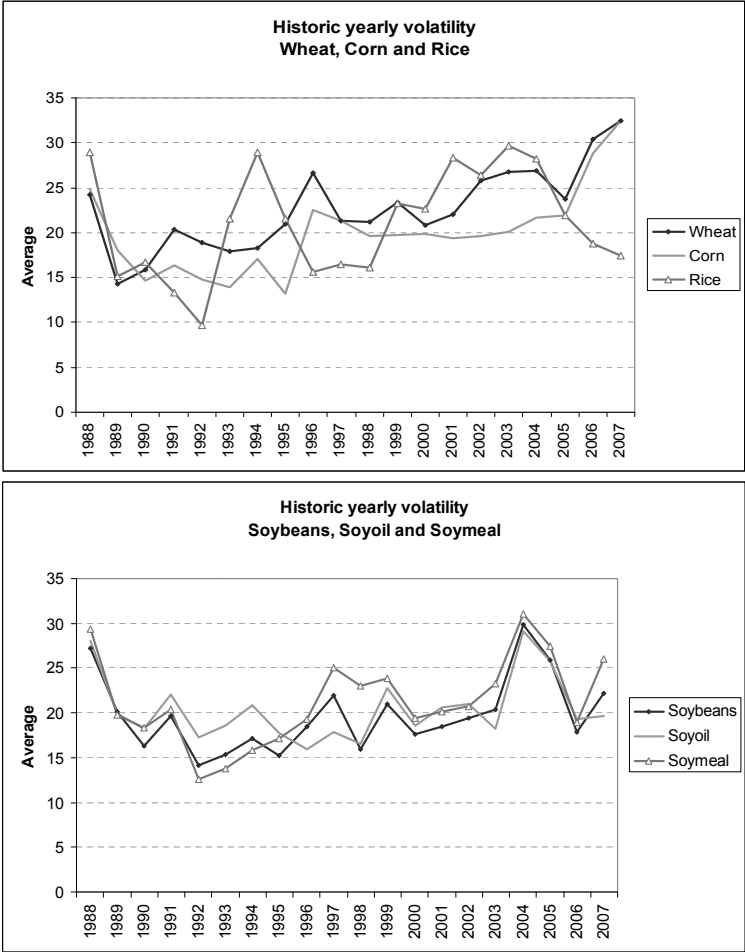


Source: FAO Trade and Markets Division and author's calculations

A most notable characteristic of the plots in figure 5 is that historic volatility (as an index of market instability) of most food commodities, while quite variable, appears not to have grown secularly in the past five decades. There also appears to be no clear correlation for most commodities between the two major price spike periods, namely 1973-75 and 2007-8 and volatility. During the first boom period, namely 1973-75 and 2007-8, volatilities of wheat, maize, soybeans and beef appear to have increased markedly relative to previous trends. However, this is not the case for rice. During the most recent boom of 2007-8, the volatility of wheat and rice appear to have increased markedly, but not that of the other basic food commodities. While these observations are just visual and need to be corroborated with appropriate econometric analysis, they raise some questions about the alleged positive relationship between the level of prices and the level of volatility.

Further questions about volatility are raised if one examines the trends in volatilities in one of the major organized exchanges, the Chicago Board of Trade (CBOT). Figure 6 exhibits historic yearly volatilities of some of the most widely traded agricultural commodities in the CBOT (wheat, maize, rice, soybeans, soybean oil, and soybean meal), for the period 1988-2007. These series are compiled by the CBOT itself and are available on line. There appears to be a noticeable upward trend in volatility in almost all these commodities (with the probable exception of rice). This, however, seems at variance with the volatility estimates indicated in figure 5, which are computed with international indicator prices, and suggested no trends.

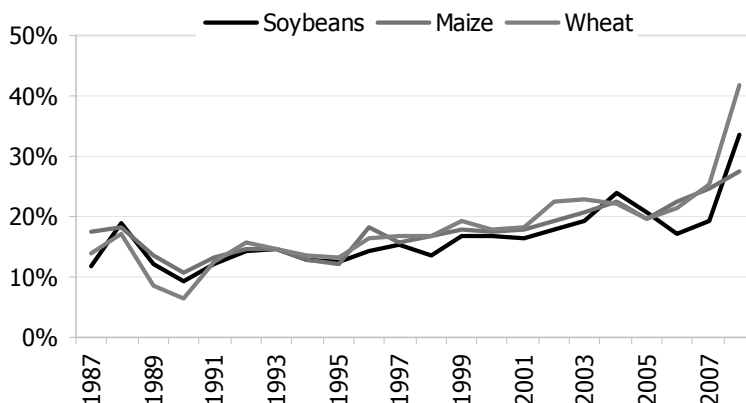
Figure 6: Historic volatilities in the Chicago Board of Trade (CBOT) for some food commodities.



Source: Chicago Board of Trade

Figure 7 exhibits data for implied volatilities, namely volatilities inferred from option prices for the indicated commodities traded in CBOT. The implied volatility is an indicator of market estimate of the conditional variance of prices in the period underlying a particular contract. In other words if the market participants have very imperfect knowledge about events leading to the period when contracts are to be enforced, then the underlying implied variance of future price conditional on current information is large, and the more imperfect or uncertain the current information, the larger is the implied conditional variance or volatility. The data of figure 7 indicate that there appears to have been a positive trend in the underlying market estimate of price uncertainty of the major CBOT trade food commodities, in the past twenty years. This appears consistent with the data of figure 6, which indicates the volatility estimates based on actually observed price changes in CBOT. In other words the underlying market estimates of future uncertainty in CBOT traded food commodities, seem consistent with the pattern of growing actual price variability for agricultural commodities traded in organized exchanges such as CBOT.

Figure 7: Implied volatilities for wheat, maize and soybeans in CBOT



Source: FAO Trade and Markets Division

As indicated above, however, the volatility of prices in CBOT do not seem consistent with the volatility of cash prices in internationally traded agricultural commodities, indicated in figure 4. This suggests that a closer examination of the factors underlying price volatility is needed.

4 Factors affecting price volatility of internationally traded agricultural commodities

In section 2 above the factors that may have contributed to the recent price spike were reviewed. The discussion of this section will concern the factors that are considered as important in affecting market volatility as expressed by price volatilities.

There are two factors that traditionally have been considered the main ones in influencing agricultural market price instability. These are the variability of production, and the level of end of previous period stocks. The more variable is agricultural production, the more one expects to observe large period to period price variations, namely larger volatility. In the same vein, the smaller the end of season stocks, the more any new market developments are likely to affect prices, and hence the more variable is market price.

Figure 8 exhibits trends in the coefficients of variation of annual production of wheat, maize, rice, and soybeans computed for four ten year periods ending in 1999, as well as the most recent period 2000-06, and for the five continents, as well as the world as a whole. The data indicates the magnitude of year to year variability of agricultural production relative to the ten

year average of the relevant period, in order to ascertain whether there appear to be any discernible trends.

Figure 8: Coefficients of variation of regional and global production of major food commodities since 1961.

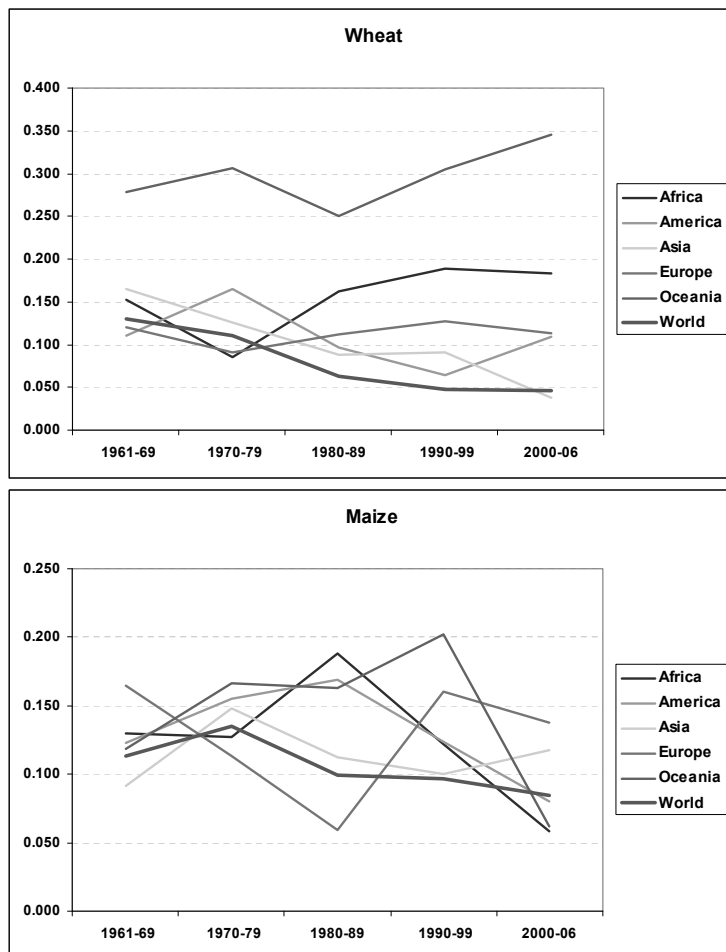
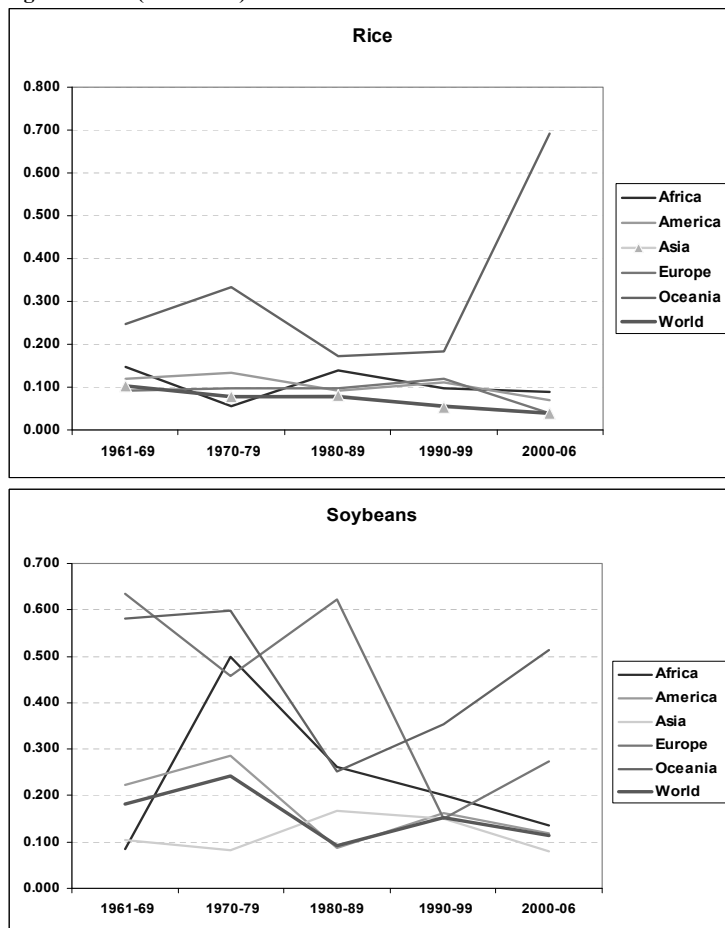


Figure 8 (continued)



Source: Computed from FAO data

Concerning wheat, there appears to be a marked decline in world production variability, and significant reductions in production variability of America (North and South) and Asia, which between them account for 60 percent of global production. It is only Africa, which accounts for a small share of global wheat production (only 3.3 percent), where production variability seems to have increased. Similarly for maize, global production appears also to have become less variable, with no apparent significant positive trend in any continent. Global paddy rice production variability also appears to be declining over time. The trend is similar in all continents, except Oceania, which, however, accounts for only 0.1 percent of global paddy production. The trend in global soybean production variability also appears to be negative, with most continents exhibiting declining or at most non-increasing coefficients of variation. It thus appears that one of the main traditional factors that affects price volatility, namely production variability has become less important over the previous 50 years. Hence this factor, if anything, implies lower overall market volatility.

Turning to end of season stock levels, figure 9 exhibits the end of season global stocks both absolutely as well as share of total utilization for wheat, maize, and rice, and also the same figures without China for the past twenty years. The first observation is that global end of season stocks of cereals do not appear to have been in 2007-8 much smaller in absolute levels than in earlier periods, notably the early-mid 1990s. Stocks increased considerably and reached a peak around 2000-2001 and then the started declining. The decline continued until 2004-5 and these trends occurred both with and without China. After 2005 stocks appear to have increased or at least not decrease in absolute terms.

Figure 9: Global ending stocks of major cereals and stock to utilization ratios for the whole world and for the world without China

A. Wheat

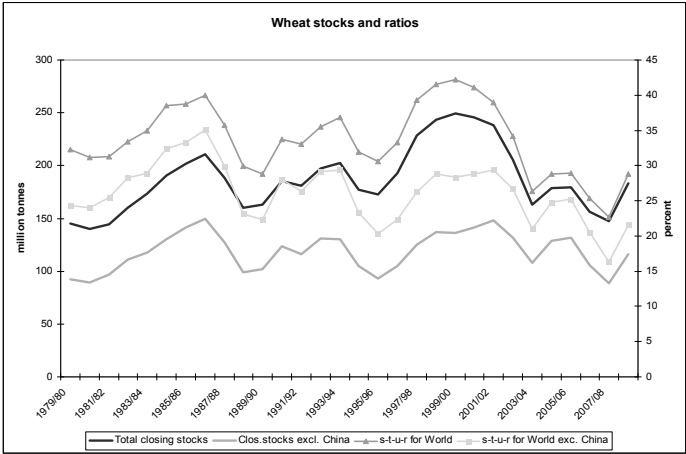
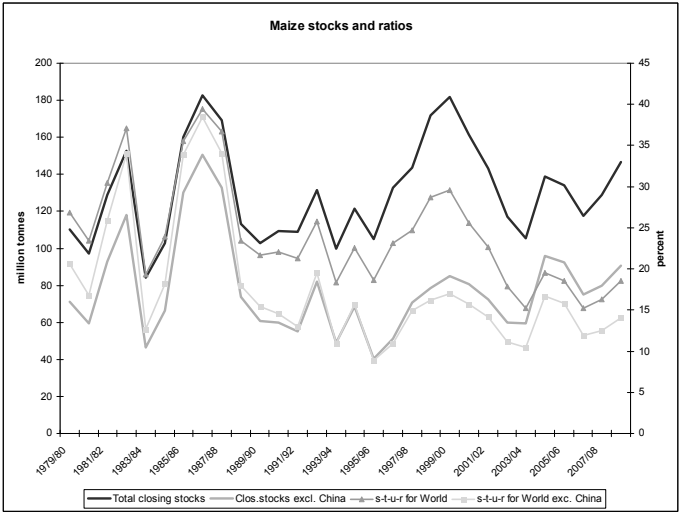
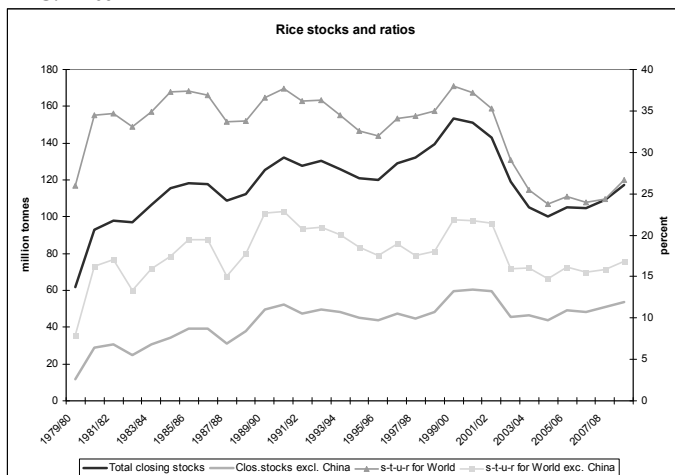


Figure 9 (continued)

B. Maize



C. Rice



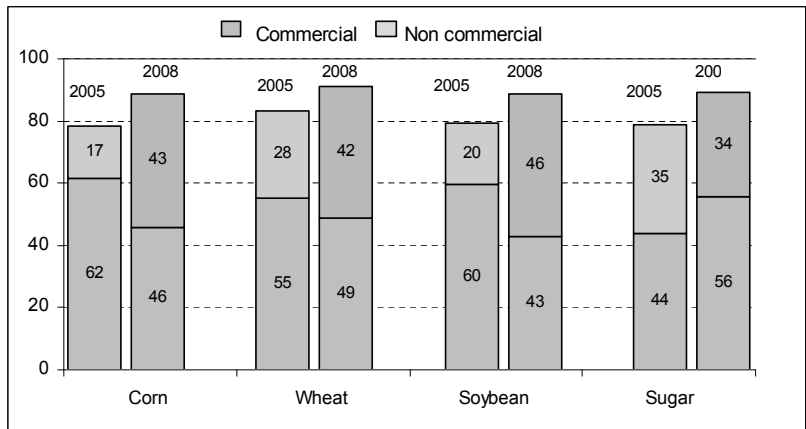
Source: FAO Trade and Markets Division

Turning to stock to utilization ratios, the most interesting observation from figure 9 is that the ratios seem to follow the same patterns and turning points both with as well as without China. Also, albeit there appears to be a negative trend in the ratio of stocks to utilization for the world, when one examines the whole 30 year period from 1979 onwards, there is no marked negative trend for the ratios if China is excluded from the world total. In fact for rice, the ratios for the world as well as without China exhibit a slight positive trend.

However, China is an important producing and trading country, accounting for 17-18 percent of global wheat production, 15 percent of coarse grain production and 29 percent of global paddy rice production. It also, and for the most recent years for which data is available (2007-8), accounts for 39 percent of global end of season wheat stocks, 30-33 percent of global coarse grain stocks, and 53 percent of global rice stocks. It is clear that, irrespective of whether the Chinese authorities use stocks for domestic market stabilization or for managing their net export/imports of basic food commodities, the size of Chinese stocks is likely to weigh heavily on any market analysis of these commodities, and on price expectations.

Turning now to the newer factors affecting market volatility, the most difficult to analyze is the influence of commodity traders in organized exchanges. The reason that this is very difficult, is that the classification of traders as commercial (namely those who have an interest in the actual physical commodity), and non-commercial, that has been adopted in several large exchanges, and on the basis of which some data can be compiled, is not representative of the actual intentions and positions of financial funds, as well as other non-commercial actors (GILBERT, 2009).

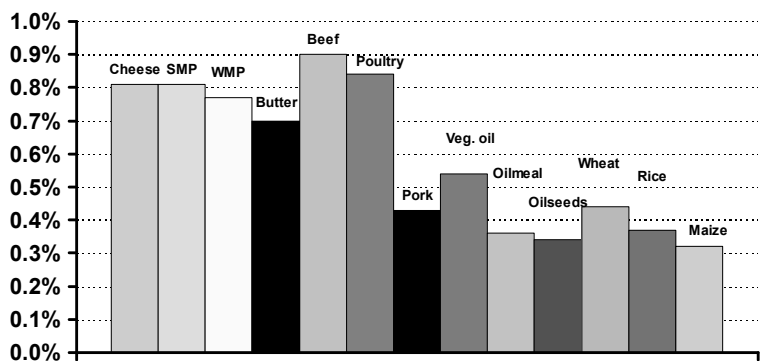
Figure 10: Shares of commercial and non-commercial traders in open interest in selected futures markets in CBOT



Source: FAO Trade and Markets Division

Figure 11 exhibits a rather aggregated picture of the participation of commercial and non-commercial traders in total open interest in CBOT and in selected futures markets. There is no doubt that the share in open interest of non-commercial traders increased considerably in all CBOT markets between 2005-8, and this is the period of the financial boom. However, this simple contemporaneous development is not a proof of causality. The question is whether the undoubted increase in participation of non-commercial traders in the organized futures and other derivative markets, affected the market fundamentals, and in particular the level of prices and volatility. There is very little research on this issue, but some recent empirical analysis by Gilbert, 2009, and a policy brief by the Conference Board of Canada (CBS, 2008) seem to suggest that is price volatility that attracts non-commercial and other financial traders, and not the other way around.

Figure 11: Impact of a 1 percent USD depreciation against all currencies on world agricultural commodity prices.

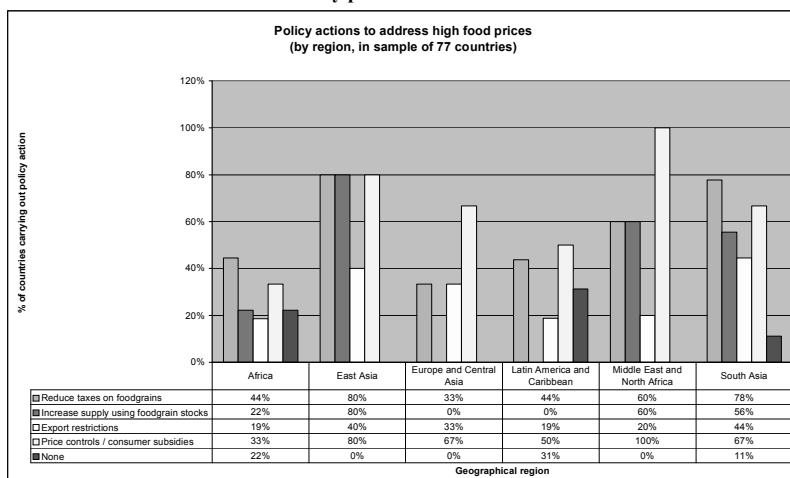


Source: FAO Trade and Markets Division

Nevertheless, we saw in earlier figures that the volatility trends in CBOT seem to have evolved in a different manner than the volatility of the cash markets. If it is the futures markets that are most influenced by participation of financial and commodity funds, then this raises a very disturbing question, and that is whether the increased participation of non-commercial traders and the ensuing increased market volatility in organized exchanges, may have affected the link between the cash and futures markets. Anecdotal evidence suggests that market hedgers (traders, processors, etc.) in some recent periods did not believe that the organized commodity derivative markets (for futures and options) were reflecting the fundamentals of the actual markets, and may have withdrawn from using it as extensively as in the past. This could affect marketing patterns, as the risk management function of futures and options markets may have been lessened. This, however, is not conducive to expanding and globalizing more the trade in the underlying commodities, and hence may affect the actual markets in an unpredictable and undesirable manner. However, this is just a hypothesis that must be investigated further before any conclusions can be drawn.

A lot has been said about the influence of the unstable exchange rate of the US dollar on commodity markets. It is a fact that in recent years the USD exchange rate has varied considerably against the currencies of other major trading countries. For instance the USD depreciated against the Euro by more than 30 percent between 2003 and 2007. It is also the case, albeit not obvious that since the prices of most internationally traded agricultural commodities are quoted in USD, a USD depreciation has a considerable influence on USD prices of traded commodities. Figure 12 indicates that a 1 percent USD depreciation against all currencies, *ceteris paribus*, can have significant upwards influence on all agricultural commodity prices, and for some the relevant elasticity can be as high as 0.8-0.9 (this occurs mostly for livestock commodities, where developed countries are the major traders, and exchange rates most variable). Clearly then it appears that the instability of the USD exchange rates must have contributed significantly to market price volatility. Given recent global financial and production developments, the huge international financial flows they imply from agents looking for safe heavens, it is likely that this instability will continue in the future, and hence this is likely to continue affecting adversely commodity market volatilities.

Figure 12: Policy actions adopted by a sample of 77 developing countries to deal with high international food commodity prices



Source: FAO Trade and Markets Division.

Apart from the instability of the USD, macroeconomic instability is likely to have contributed considerably to commodity markets instability. Gilbert, 2009 in his empirical analysis finds that both money supply as well as GDP seem to Granger cause commodity prices. The influence maybe indirect, for instance through interest rates as FRANKEL (2008) has already indicated. The current financial crisis, does not bode well for monetary stability, especially given the significant monetary expansion that is likely to follow the fiscal stimulus packages now envisioned in most large economies. Hence it is likely that macroeconomic factors will continue adding instability to world commodity markets.

The price of petroleum was already alluded to as an important determinant of agricultural commodity prices, especially for those commodities which can be utilized as biofuel production stock. SCHMIDHUBER (2006) has shown that when petroleum prices are in a certain price range, then oil prices and biofuel stock prices seem to be much strongly correlated. This has been empirically substantiated by BALCOMBE and RAPSOMANIKIS (2008) and for the sugar-oil—ethanol group. Several analysts have attributed significant influence on agricultural commodity prices from petroleum prices, coupled with biofuel policies (e.g. MITCHELL, 2008, Abbott, et. al. 2008). Despite the rapid fall of petroleum prices in late 2008 and early 2009, the underlying demand for oil in the medium term is real and likely to increase (OECD-FAO, 2008). This is likely to induce a continuing linkage between petroleum prices and biofuel stock prices, albeit not at all periods. As oil prices are likely to be quite unstable given the uncertainties in global economic growth, this most likely will induce instability of the agricultural commodity markets, both for those those products that are directly related to biofuels, such as maize, sugar, and rapeseed, but also in commodities that are substitutes in production.

The final factor that is likely to affect commodity market volatility is country policy actions and reactions to external events. The commodity scare of 2007-8 and the publicity it received made many governments overreact, by measures that were not always effective at achieving their stated objectives. Table 12, compiled from a FAO survey of government actions in 77 developing countries during the 2007-8 period, tabulates the type of measures that were undertaken in response to the global price rises. The first observation is that there are only a few countries whose governments did nothing in response to the global commodity crisis. Perhaps surprisingly the region where few additional policies were adopted appears to be Africa

5 Main factors that will affect future agricultural commodity price volatility

Market volatility may offer opportunities for speculators, but it is certainly problematic for the participants in the physical markets. Given the size of the recent international price variations during a single year, (sharp increases in late 2007 and early 2008 and equally sharp price decreases in late 2008), many governments and market agents are rightfully questioning whether this type of extreme market volatility might continue in the future. In this context the following thoughts may be useful in assessing the future prospects for market volatility.

First, it will take some time for food stocks to be replenished, especially if unusual weather events continue to occur over the next few seasons. Despite the fact that prices have come down from their peaks of 2008, and that global production seems to have responded positively to the crisis, the decline in prices may discourage many farmers from further production increases, and governments from productive investments. Hence, stock replenishment may be a slow process, implying that the markets will be tightly balanced for some time to come. With the financial crisis hitting on top of the food crisis, financing will also be scarce for all investments, and this will include investments in stocks. Low interest rates will certainly not make this process any easier, as FRANKEL (2008) has argued.

Biofuel demand is likely to be important for some time, if petroleum prices stay high. With the global financial and now economic crisis lowering overall petroleum demand, this looks like a less pressing issue, but petroleum prices are highly uncertain, and hence it is not clear that they will come down strongly and persistently. Hence, biofuel demand is likely to stay strong, especially since mandates are likely to stay, and investments made in biofuel producing plants will not be easy to just abandon. Finally, biofuel demand is likely to stay until more energy efficient new generation biofuels that do not compete with land resources for food production become widely available commercially, and this is not likely to happen for several more years.

The overall conclusion then is that the global food commodity markets are likely to stay volatile in the next few years, until stocks are replenished, petroleum prices stabilize, and the global financial crisis works itself out. An added risk is that the efforts currently made to renew emphasis on agricultural investments to boost productive efficiency, especially in developing agriculture dependent countries, are derailed by the probably short lived hiatus of low global food commodity prices. This calls for continuing watch on global food markets and developments.

References

- ABBOTT, P.C., HURT, C., TYNER, W.E., 2008. What's driving food prices? Issue Report. Farm Foundation. Available at <http://www.farmfoundation.org/>
- BALCOMBE, K. AND RAPSOMANIKIS, G., (2008). Bayesian estimation and selection of nonlinear vector error correction models: the case of the sugar-ethanol-oil nexus in Brazil, *American Journal of Agricultural Economics*,
- BALTZER, K., HANSEN, H., LIND, K.M., 2008. A note on the causes and consequences of the rapidly increasing international food prices. Research Report. Institute of Food and Resource Economics, University of Copenhagen. Available at <http://www.danidatdevforum.um.dk/en/servicemenu/news/theglobalfoodsituation.htm>
- CBC, 2008. Is Food Commodity Securitization Worsening the World's Food Problem? Policy Brief, Conference board of Canada, Available at <http://www.conferenceboard.ca/documents.asp?rnext=2662>
- FRANKEL, J. 2008. The Effect of Monetary Policy on Real Commodity Prices, in J. Campbell (editor), *Asset Prices and Monetary Policy*, University of Chicago Press.
- GILBERT, C. L., 2009. Commodity Speculation and Commodity Investment. Unpublished paper, forthcoming in *Journal of Commodity Markets and Risk Management*, 2009.
- HEADEY, D. AND FAN, S., 2008. Anatomy of a Crisis: The Causes and Consequences of Surging Food Prices, *Agricultural Economics*, (39) supplement, 375-391
- HELBLING, T., MERCER-BLACKMAN, V., CHENG, K., 2008. Commodities boom: Riding a wave. *Finance Dev.* 45.
- MITCHELL, D., 2008. A Note on Rising Food Prices. Policy Research Working Paper No. 4682. The World Bank, Washington, DC.
- OECD-FAO, 2008. *Agricultural Outlook 2008-2017*. Paris and Rome.
- SAMUELSON, P.A., 1957. Intertemporal Price Equilibrium: A Prologue to the Theory of Speculation, *Weltwirtschaftliches Archiv*, 79, 181-219; reprinted in P.A. Samuelson, *Collected Scientific Papers* (ed. J.E. Stiglitz)
- SCHMIDHUBER, J. 2006. Impact of an increased biomass demand use on agricultural markets, prices, and food security: A longer-term perspective. International Symposium of Notre Europe, Paris. Available at <http://www.fao.org/es/esd/biomassnotreEurope.pdf>

- SCHNEPF, 2008. High Agricultural Commodity Prices: What Are the Issues? CRS Report for Congress. Congressional Research Service, Washington DC. Available at http://assets.opencrs.com/rpts/RL34474_20080506.pdf
- TROSTLE, R., 2008. Global Agricultural Supply and Demand: Factors Contributing to the Recent Increase in Food Commodity Prices. ERS Report WRS-0801. Economic Research Service, US Department of Agriculture (USDA). Available at <http://www.ers.usda.gov/publications/wrs0801>
- VON BRAUN, J., AKHTER, A., ASENSO-OKYERE, K., FAN, S., GULATI, A., HODDINOTT, J., PANDYA-LORCH, R., ROSEGRANT, M.W., RUEL, M., TORERO, M., VAN RHEENEN, T., VON GREBMER, K., 2008. High Food Prices: The What, Who, and How of Proposed Policy Actions. IFPRI Policy Brief. International Food Policy Research Institute (IFPRI), Washington, DC. Available at www.ifpri.org/PUBS/ib/foodprices.asp