



PRICE VOLATILITY FROM A GLOBAL PERSPECTIVE¹

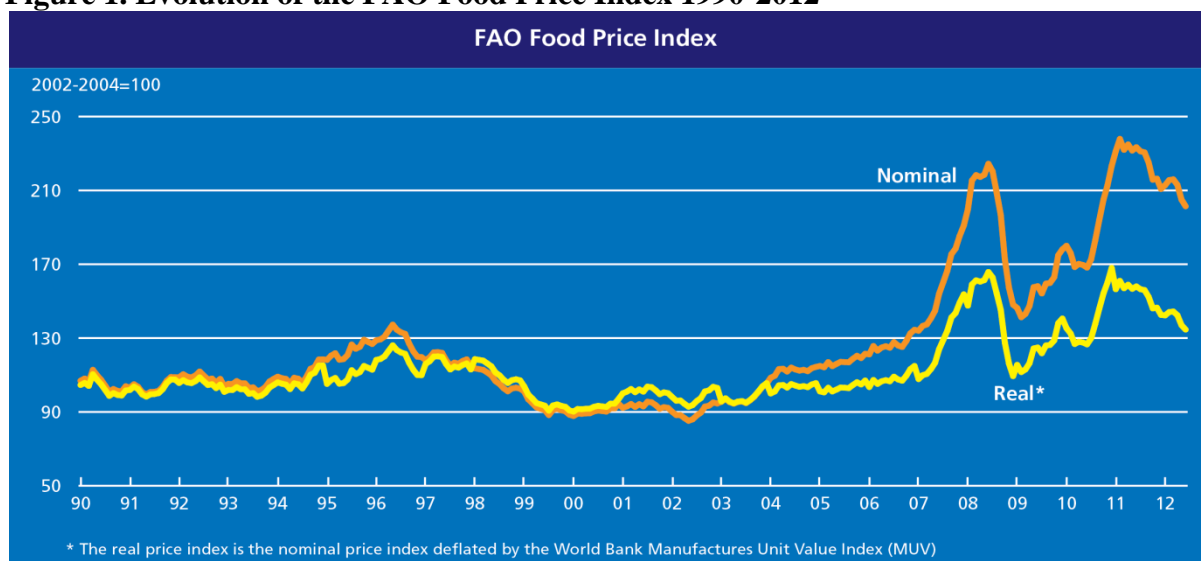
Technical background document for the high-level event on:
“Food price volatility and the role of speculation”
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1. Introduction

For most of the past fifty years, real agricultural commodity prices followed a downward trend punctuated by short-lived peaks that were not matched by equally pronounced and short-lived price falls but rather were separated by extended price troughs. Since 2000 it appears that prices have departed from their long-term downward trend and have become increasingly volatile (Figure 1). Prices increased between late-2006 and mid-2008 to their highest level in thirty years, fell sharply through 2009 then regained their 2008 peak in late-2010-early 2011. The resurgence of high food prices in 2010 prompted fears of a repeat of the 2007-8 food crisis threatening increasing food insecurity, rampant food price inflation and civil unrest. Fortunately, the worst fears have not materialized generally. However, the OECD-FAO *Agricultural Outlook* expects prices to remain above their historical trend levels and to continue to be volatile in the medium term. High and volatile agricultural commodity prices are likely to persist and continue to challenge the ability of consumers, producers and governments to cope with the consequences.

Figure 1. Evolution of the FAO Food Price Index 1990-2012



¹ Paper prepared by the FAO Trade and Markets Division (EST)

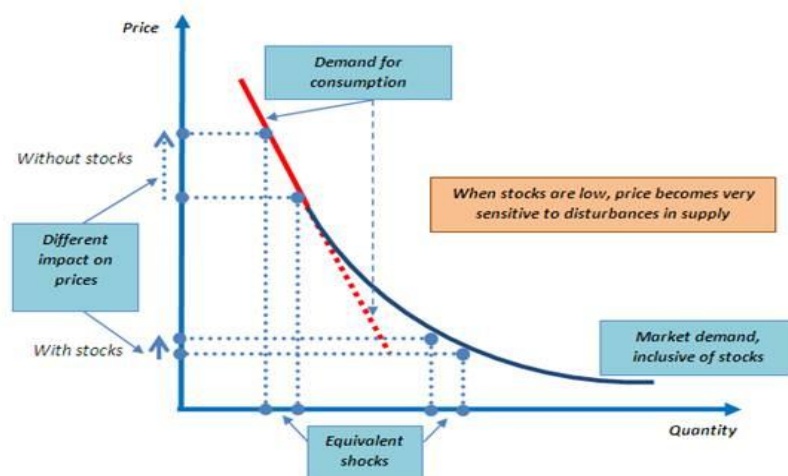
2. Why are food prices high and volatile?

The secular downward trend in real prices reflected a tendency for technical improvements to increase yields and production faster than population and income growth increased demand. However, recent years have seen some slowing of the rate of yield growth, while demand has continued to grow rapidly. On the supply side, a deterioration of the natural resource base, and low levels of investment in agriculture and in research and development, whether international or national, public or private, have slowed production growth. On the demand side, high rates of economic growth in emerging economies have increased food demand especially for livestock products and hence for feed grains. At the same time, there has been increasing demand for certain agricultural products which are used as feedstocks for biofuel production. As a result of these factors, agricultural commodity prices have strengthened in recent years, a phenomenon that has also been accompanied by heightened price volatility.

Some degree of price volatility is typically observed in agricultural commodity markets due to three **market fundamentals**. First, agricultural output varies from period to period because of natural shocks such as weather events (droughts, floods, etc.) and pests and diseases. Second, since agricultural product demand and supply are inelastic in the short-run, wide price adjustments may be necessary to clear markets, especially where stocks are low. Third, as production takes considerable time in agriculture, supply cannot respond much to price changes in the short term, unless stocks are available somewhere to counter changes in production. The recent episode of price volatility has its origins in such fundamental factors – strong demand from developing economies facing shortages of supply caused by weather shocks in key producing and exporting countries in a situation of low stock levels.

Low stock levels amplify price movements and cause persistence in volatility until inventories are replenished, especially in major exporting countries. Depending on the size of the initial shock, this could take several crop years. For the market to function effectively, a virtually irreducible minimum amount of the food commodity must be held in the system to transport, market and process. As shown in Figure 2, when price is high and stocks (excluding essential minimal levels) are zero, the market demand is the same as the consumption demand. Those who consume food commodities such as rice, wheat, or maize as their staple foods are willing to give up other expenditures (including health and education) to continue to eat, so the consumption demand is unresponsive to price changes ("inelastic"). In this situation, large price swings are needed for consumers, at least those who can afford to pay, to adjust to the full impact of a supply shock un-moderated by adjustment in stocks.

Figure 2. Stocks, demand and prices



In 1972-74, for example, a reduction in world wheat production of less than 2 percent at a time when stocks were almost negligible caused the annual price to more than double. The figure also shows how, when stocks are clearly above minimum working stocks, storage demand, added horizontally to consumption demand, makes market demand much more elastic (less steeply sloped) at a given price.

In addition to market fundamentals, a catalogue of factors point to a likelihood of higher prices and a risk of increased volatility in future years. Experts concur broadly that **climate change** will, in the longer term, lead to worsening conditions in some arid and semi-arid regions where agricultural production is already difficult, while temperate regions in particular, but not exclusively, may benefit. It is also thought that climate change will lead to more frequent extreme events such as droughts, heat waves and floods. Clearly, climate change will provoke some adjustment of production patterns around the world, as well as increased risks of local or regional supply problems that could add to future volatility.

Changes in the **geography of production** are making output more variable, in turn leading to increased price volatility. Production is moving towards distant and potentially fragile areas of greater yield variability, a phenomenon that is already occurring. World markets are more dependent on supplies from new agricultural production regions than in the past. Yields in these regions are less stable and supply more variable than in some other parts of the world where natural conditions are better and where the application of technologies and improved management practices have both increased and stabilised yields.

Beyond the uncertainty driven a changing climate and a fragile environment, the trajectory of the global food system is increasingly subject to external **economic shocks**, which are being manifest from a range of complex sources and becoming more frequent. These shocks have had a profound influence in shaping the agricultural landscape in recent years, and are likely to play an equal role in the years to come.

Policy responses by countries to price spikes also contributed to volatility, and could continue to do so unless the international community is able to take steps to avoid such actions. During the 2007-2008 period, some policy measures put in place by a number of countries and panic buying exacerbated the situation, increasing the amplitude of price movements and in some cases provoking price increases that were otherwise inexplicable by market fundamentals.

The increasing linkages between **energy markets** and those of agricultural commodities has also contributed to increased food price volatility. A first link is through the close relationship that exists between energy prices and agricultural production. Petroleum price volatility, which tends to be high, translates into food price volatility through two key elements: transportation costs and fertilizer prices. A second link occurs through biofuels and the expanding use of agricultural commodities as feedstocks for biofuel production. As such, price transmission of oil price fluctuations to crop prices may be more rapid.

The linkages between macroeconomic factors and agricultural markets have received increased attention in recent years, with movements in **exchange rates** in particular having potential impacts on food prices. Changes in exchange rates, especially of major exporting countries, translate to changes in international food prices. Thus, as macroeconomic factors lead to more volatile exchange rates, food price volatility also rises.

3. Speculation and food price volatility

Among the explanations for recent volatility in food prices the impact of “speculation” has perhaps been the most controversial. Opinions are sharply divided between those who see no impact of speculation on price levels or volatility and those who see it as the most significant explanatory factor for the recent higher levels of prices or at least recent volatility. Limitations of the available data and information makes it difficult to prove or disprove either hypothesis. More research is needed.

Typically, commodity exchange markets provide risk management tools such as futures and options to enable market participants like farmers, processors, producers or traders – “commercial traders” – to hedge against the risk of price fluctuations in the future. Futures contracts involve the formal obligation to sell or buy a given amount of a commodity at a specified time. They thus provide an important instrument to “hedge” against the price risks in commodity markets and are basically used by all traders of physical commodities as part of their normal trading behavior. By entering in a futures contract, both the seller and the purchaser gain certainty of the price of their transaction, independent of the actual development of the market. These markets also assist in the discovery of prices and thus provide a measure of predictability in ascertaining future prices. However, only two percent of futures contracts end in the delivery of the physical commodity. Instead, commodity futures are generally traded before their expiration date. As a result, futures also attract investors who are not interested in the commodity as such, but in making a speculative profit on future movements in the price of an asset or a commodity.

Commodity futures have become increasingly appealing to “non-commercial” investors as their returns seem to be negatively correlated with returns to equities and bonds. They thus constitute an attractive vehicle for portfolio diversification. There has been a significant inflow of funds into agricultural commodity futures markets looking for profits from traditional institutions such as hedge funds and pension funds and from newer commodity-linked and exchange-traded funds. The share of non-commercial traders taking long positions in the commodity markets has been rising, indicating increased interest on their part in buying futures contracts. Between 2006 and 2011, non-commercial traders almost doubled their share of open interests in the Chicago wheat, corn and soybeans futures market. Investments by institutional investors can be large, although the volume of these investments in agricultural commodities has not been as significant as in other commodities such as metals. The increase in the shares of noncommercial traders in maize, wheat and soybean markets coincided with the increase in prices of these commodities in the physical markets peaking in mid-2008 leading some analysts to connect the increases in food prices with increased speculation.

It is important to note that speculation is important for the efficient functioning of markets because it brings liquidity into the market and helps farmers and other participants to offset their exposure to future price fluctuations in the physical commodity markets. Speculators are assuming risks related to the price of the commodity. Some economists argue that futures markets have a stabilizing effect as traders merely react to price signals that eventually depend on market fundamentals. In this way speculation would even accelerate the process of finding an equilibrium price.

However, speculation can also play a perverse role in markets. Excessive levels of speculation can lead to sudden or unreasonable fluctuations or unwarranted changes (in one particular direction) in commodity prices. This may occur when an increasing share of open interests (number of outstanding futures contracts) is held by investors interested in gaining from future price movements with little regard to the fundamentals of commodity demand and supply. Where these active investors are trend-followers, they may be attracted by the opportunities offered by an upward movement in a commodity price although this

development may not be based on change in market fundamentals. These speculative investments could strengthen the trend and push the futures price further from its true equilibrium, especially if many investors jump on the bandwagon (“herd behavior”) or those who invest have sufficient funds to influence the market. Index funds are an example of such powerful investors. They have become key players in the market, holding about 25-35 percent of all agricultural futures contracts. Besides investing large amounts of money, they also hold futures contracts for a long time. Some observers suggest that this passive trading behavior makes them less likely to react to changes in market fundamentals. Excessive speculation in agricultural commodity markets may therefore transmit inappropriate market signals to agricultural producers, leading to inefficient allocation of resources. The development of high-speed algorithmic trading exaggerates this risk.

Econometric analyses of the relationship between futures prices and the positions of different types of trader have yielded conflicting results. Evidence on the direction of causation between the two is also inconclusive. The IMF concluded that in general it was the high prices that were encouraging inflows of investment funds into futures markets for agricultural commodities rather than speculative inflows leading to higher prices. Clearly, there is a need for further research. However, while the econometric evidence is inconclusive there appears to be some emerging consensus that speculation has contributed to recent futures price volatility, at least in exaggerating the magnitude and duration of short-run price movements. In the longer-run, physical market fundamentals prevail.

The view that speculation has impacted on recent price volatility has led to increasing pressure for the introduction of greater regulation to limit this speculation. However, the question of how much and what form of regulation is also controversial. Since commodity futures have become an integral part of food markets and perform an important role for many market participants, there is a concern that regulation should improve, not ban, speculative trading in order to improve market performance. Position limits, for example, limit the number of speculative futures contracts that one participant, can hold, thereby limiting the ability of a single participant to influence the market. At the same time, concern has been expressed that excessive regulation could drive speculators out of the market, depriving it of liquidity needed for hedging. There is wide agreement that greater transparency through increasing the amount of available information on futures trading positions can enhance confidence in the good functioning of the market. There is also wide agreement on the need for greater transparency on “over-the-counter” trading.

In the United States, the Commodities Futures Trading Commission has been given greater powers by the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. The CFTC defines and enforces speculative position limits and reporting requirements to promote transparency. The European Union is following suit to strengthen regulatory measures.

4. Why volatility matters?

The impact of food price volatility falls heaviest on the poorest – especially the urban poor and the landless – who may spend as much as 75 percent of their income on food. Diets of the poor also often lack diversity so the scope for switching to less expensive foods is often limited. High food prices reduce the quantity and the quality of the food they can consume, worsening food insecurity and malnutrition and pushing more households below the poverty line. The high prices of 2007-8 pushed an estimated additional 80 million people into hunger, bringing the world total to around one seventh of global population. High and volatile food prices challenge the fundamental human right to adequate food. They not only increase, but also deepen poverty and food insecurity and lead to irreversible harm. Reduced and variable real income leads not only to malnutrition but also reinforces poverty traps as physical and human capital is eroded and spending on education is cut.

The impact of high and volatile food prices on consumers is clearly negative but what about the impact on agricultural producers and exporters? In principle higher prices should be good news for them. Provided the rents arising from higher prices are not taxed away by government but rather go to producers, they should provide both an incentive and the finance for increased investment and a positive supply response. However, in practice the incentives and a positive supply response may not materialize. Input prices, especially for oil-based fertilizers, can increase faster than output prices leaving producers no better off. Supply-side constraints such as transport and storage limitations or lack of access to inputs and credit can prevent producers capitalizing on higher prices. For poor food producers price volatility means uncertainty and increased risk that deter the investments essential to increasing food production and reducing vulnerability. As a result of these problems, most developing countries saw a muted supply response to the high prices of 2007-8.

Governments need to ensure that such opportunities for growth and increased export revenues are not squandered. They need to create an enabling environment that supports the channelling of increased producer revenues into investment and growth. But this may not be straightforward given other policy claims and constraints such as defending food security and controlling inflation. Targeted input subsidies, investments in productive infrastructure such as storage and irrigation, risk management, research and extension all have a role but involve significant budgetary cost.

At national level, increasing food prices fuel inflation while increasing and volatile food import bills threaten exchange reserves and disrupt development budgets and slow growth and development. Where agricultural commodity exports are significant, price volatility on international markets can be transmitted to government revenues and the rest of the economy. Furthermore, many agricultural commodity exporters, especially LDCs, are net food importers so higher international agricultural prices can actually worsen the balance of payments and threaten foreign exchange reserves as well as fuel domestic inflation and increase budgetary outlays on protecting poor consumers. Micro- and macro-economic management in the face of international commodity price volatility poses unique problems for developing countries.

5. Policy responses to price volatility

Policy measures can seek to reduce international price volatility itself or ameliorate its consequences, especially for the most vulnerable. Past experience suggests that direct intervention in international food markets to stabilize prices is problematic. Buffer stocks, for example, involve significant costs to defend a target price and their effective management needs to overcome a variety of informational and practical difficulties. The policy responses of individual countries to domestic food price volatility can make prices on international markets even more volatile. The imposition of export restrictions by major exporters is particularly damaging and existing trade rules regarding export measures are relatively weak. Better international trade policy coordination in times of crisis can avoid this and ensure that global markets continue to be seen as a reliable source of food. The biofuel subsidies and mandates used by some countries have also been blamed for raising food prices on international markets as supplies of certain products, notably sugar, corn and oilseeds, are diverted into biofuel production. Calls have been made for more flexible policies that take account of their impact on the availability and price of food. Similarly controversial is the issue of whether futures markets should be regulated to limit the extent to which they might exaggerate price movements. Futures markets play a vital role in price discovery, risk management and providing liquidity and the evidential base is weak so caution is needed. While there is no consensus on whether or how futures markets should be further regulated there is broad agreement that more transparency is needed.

The same goes for physical markets. Volatility is exacerbated by a lack of accurate information on the international supply, demand and stocks situation. Increasing information on global markets and enhancing transparency will reduce the incidence of panic-driven price surges of the kind seen in rice markets in 2008. It should also permit better informed and coordinated policy decision-making to prevent policy responses of individual countries making international prices even more volatile and to ensure that global markets are still seen as a reliable source of food. The experience of the 2007-08 food price crisis and today's high and volatile prices have exposed weaknesses in information concerning world food supply and demand, a lack of reliable indicators of when crisis threatens and a lack of policy coordination to avoid individual country responses turning a bad situation into a crisis. While greater regulation of "speculation" or creation of buffer stocks or reforming biofuel policies all have their advocates these policy responses remain controversial. Where there *is* consensus is on the need for better information and more transparency in international food markets.

The experience of the 2007-08 food price crisis also exposed the lack of preparedness and low level of resilience to international food price surges. Measures can be taken to ameliorate the negative consequences of volatility for individual countries at national and international levels. Targeted national safety nets such as school feeding programmes or cash transfers can provide short-term relief. Strategic emergency food reserves can help ensure food security. However, such measures carry a high budgetary cost and cannot easily be put in place as an emergency response. Countries need to be prepared in advance. World Bank emergency assistance and IMF emergency financing can help countries provide domestic safety net measures and overcome food import financing difficulties.

The issue of agricultural price volatility and how to deal with it has been at the top of the G20 agenda. In June this year, agricultural ministers agreed on an action plan to combat volatility itself and its negative impacts on the food security of the most vulnerable that will be submitted to the G20 Leaders at their November Summit. The discussions were based on an Interagency Report on Food Price Volatility prepared by FAO, OECD, IFAD, IMF, UNCTAD, WFP, the World Bank, the WTO, IFPRI, and the UN HLTF. The efforts of these ten International Organizations were coordinated by FAO and OECD. The report put forward a number of concrete policy options aimed at both reducing volatility and mitigating its negative effects. One recommendation was for the creation of an Agricultural Market Information System (AMIS) to be based in FAO to improve information and transparency and promote policy dialogue and coordination at the global level. AMIS will provide the basis for global food market alerts to price surges, operating as an international early warning system. The inception meeting of AMIS took place in September.

6. Building resilience in the longer term

The vulnerability of the poor to the negative impacts of volatile prices is the result of more than 20 years of under-investment and neglect of the agricultural sector. For most poor countries a healthy agricultural sector is essential to reduce vulnerability to international price volatility, to overcome hunger and poverty and to provide the platform for overall economic growth and sustainable development. Substantial increases in investment are needed to reduce the vulnerability of developing countries to international food price volatility and enhance food security.

In the longer term, the resulting increases in food production by developing countries can also assist in reducing that international volatility. Investments in infrastructure, extension and credit services, education and training, as well as in research and development specific to smallholder agriculture, can increase food supply in developing countries and improve the functioning of local agricultural markets, resulting in less volatile prices. In this way, markets can work for the poor people who bear the burden of food price volatility.