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Through *Perspective*, CIRAD provides an opportunity to explore new avenues for discussion and action based on research.

Intervention on biofuels and the Japan WTO rice stock to stabilise world food prices

Franck Galtier

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>> Série *Crises and food security*

On international markets, prices of grains (wheat, maize) and vegetable oils (rapeseed, sunflower, soybean, palm) have been rising since mid-2020. Biofuels play a major part in this increase, and the war in Ukraine, which began in February 2022, has exacerbated it. Biofuels in fact link the price of these commodities to that of crude oil: when the crude oil price rises, the biofuels industry increases its demand for maize and vegetable oils. Temporarily limiting

this industrial usage would reduce the price of these commodities. Moreover, in case of an increase in rice prices, one solution would be to authorise Japan to export the rice stock it has built up under World Trade Organization (WTO) rules. In order to prevent future crises, these two levers could be activated as soon as world prices of these agricultural commodities reach predetermined levels.

Key recommendations

- > Temporarily limiting the use of grains and vegetable oils to produce biofuels.
- > Transforming the Japan WTO rice stock into a virtual stock.

On international markets, the prices of essential foods, such as grains and vegetable oils, have more than doubled in the last two years. The challenges of this international crisis concern not only food security, but also poverty and political stability. For many vulnerable households throughout the world, whether in developing or industrialised countries, these products are crucial in terms of the calories and nutrients they provide, but also because of their weight in household budgets. Combined with the increase in expenditure on energy and transport, the result is a substantial reduction in purchasing power, with likely consequences for food insecurity and malnutrition, but also for health and education expenditure. We all remember the urban riots and political unrest in many countries during the previous crises, in 2008 and 2011.

What has caused these price hikes? The explanation is more complex than the argument typically advanced of the war in Ukraine. There are in fact many reasons, especially given that prices began to rise in 2020 [see box p. 2]. The intensive use of fossil fuels in the agricultural sector and the biofuels industry are part of the problem.

Faced with the crisis, a first lever: regulating the use of grains and oils by the biofuels industry

Changes to existing biofuels policies could contribute to resolving the current crisis.

There is in fact a link – a very strong one since 2008 – between the price of crude oil and that of maize [see boxes p. 2 and 3]. This link is asymmetric: when the price of crude oil increases, so does the price of maize, but when the price of crude oil decreases, the price of maize only falls to a certain level, from which it stabilises and we observe a “floor price”. This floor price is linked to biofuel policies, especially biofuel mandates, which require the incorporation of a specific proportion or volume of biofuels into fuel sold at the pump. Consequently, large volumes of maize are used to produce biofuels even when the crude oil price is too low for this usage to be cost-effective.

It is possible to reverse this mechanism by regulating grain use for biofuel production, either by banning it or by

capping it. This would bring the international maize price back to its pre-crisis level (150 US dollars per tonne). The volumes concerned are considerable: in the United States, 140 million tonnes of maize are used every year to produce biofuels. By way of comparison, the quantity of maize traded annually on the world market is around 200 million tonnes. This measure would also considerably reduce the price of wheat: although this grain is not widely used for biofuel production, its price is closely linked to that of maize due to the many substitution possibilities between the two grains [see box below]. If the price of maize were reduced to 150 US dollars per tonne by banning its use for biofuels, it is highly unlikely that the wheat price would remain at 500 US dollars per tonne. Indeed, over the last 60 years, the price difference between these two grains has only reached 200 dollars once, in February 2008, and then only for two months.

Another line of thinking consists in estimating the wheat and maize exports potentially compromised by the Ukraine conflict. The worst-case scenario is that all wheat and maize exports from Russia and Ukraine are stopped: the decline in exports would then stand at around 85 million tonnes. Taking half of the maize normally used to produce biofuels would therefore offset this potential effect of the war in Ukraine.

This thinking applies to cereals, but can be transposed to vegetable oils. This time, the European Union is on the frontline. The EU countries use huge quantities of vegetable oils to produce biofuels, amounting to around 11 million tonnes of oils, or 45% of their consumption. As a consequence, an asymmetric relationship also exists between the price of crude oil and the price of vegetable oils [see box p. 3].

The vegetable oil exports compromised by the Ukraine conflict stand at 6 million tonnes, while the European Union uses 11 million tonnes (mainly rapeseed oil) for biofuels. As with maize, halving this usage would offset the effects of the war in Ukraine.

Although some oils (rapeseed, soybean, palm) are used more than others to produce biofuels, halting this production would reduce the price of all oils: because of substitution possibilities between different types of oil, their prices are closely linked [see box below].

The two main actors concerned, the United States and the European Union, have the means to make rapid decisions on these issues. It should also be noted that halting the use of grains and vegetable oils to produce biofuels would have very little effect on the price of fossil fuels: in 2020, total biofuels only accounted for 1.7% of liquid energy demand, and the proportion is even smaller for biofuels specifically made from grains or vegetable oils.

Since 2020, there are many reasons behind the increase in grain and vegetable oil prices

Agricultural commodity prices, especially for maize, wheat and vegetable oils, began to increase in mid-2020. Just before the war in Ukraine, in February 2022, prices had already almost doubled compared to the first half of 2020 [see figures 1 and 2]. The war in Ukraine has only exacerbated this trend. That part of the world (Ukraine and Russia) produces a large proportion of the wheat and maize exported on international markets (around 20%); the same applies to vegetable oils (especially sunflower) and nitrogen fertilisers. For the time being, it is not so much production in this region that is compromised, but rather exports, which were traditionally shipped from the Black Sea ports.

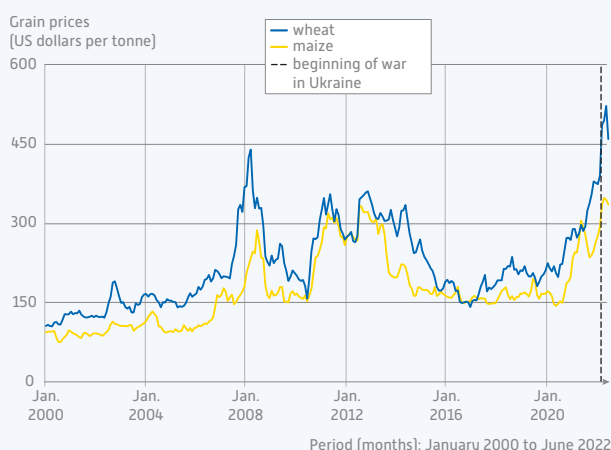
The increase in these agricultural commodity prices therefore largely occurred prior to the war in Ukraine, driven by soaring fossil fuel prices (oil and natural gas). This is partly down to the agricultural production model, based on the intensive use of these energies,

through chemical inputs (in particular nitrogen fertilisers, which are manufactured using natural gas), mechanisation and long-distance transport.

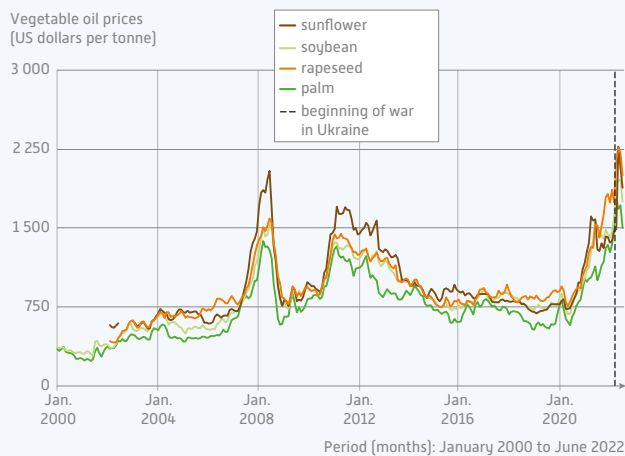
But it is above all the massive use of food products to produce biofuels, encouraged and subsidised by the states (especially the United States for maize and the European Union for rapeseed), that explains the link between food prices (wheat, maize, vegetable oils) and fossil fuel prices. When the crude oil price rises, demand for maize and vegetable oils from the biofuels industry increases and the price of these commodities rises up to the threshold from which their use as a biofuel is no longer cost-effective.

Although the war in Ukraine has amplified this crisis, holding it entirely responsible would be inaccurate. Because of their biofuel policies, the United States and the European Union are also to blame for today's soaring food prices.

1. Evolution of international prices of wheat and maize (January 2000 to June 2022).



2. Evolution of international prices of rapeseed, sunflower, soybean and palm oil (January 2000 to June 2022).



Source of figures: The World Bank, 2022. Commodity Markets. <https://www.worldbank.org/en/research/commodity-markets>

A second lever: authorising Japan to export its WTO rice stock

If the crisis were to spread to rice (experts are divided on this possibility), a relatively similar mechanism could be established for this grain, whose price plays a crucial role in food security and political stability in Asia and parts of Africa and Latin America.

Rice is a grain in its own category, with few possibilities for substitution with wheat or maize: consequently, its price is relatively disconnected from these two other grains. It is not used to produce biofuels, but there is a dormant rice stock that could be mobilised in case of crisis: the Japan WTO stock. When it joined the World Trade Organization (WTO), Japan, under pressure from certain member states, committed to import every year the equivalent of 5% of its rice consumption. This rice is imported and stored by the Japanese government – Japanese people do not want it as they prefer locally produced rice. Some is given in the form of food aid and is found, for example, in public stocks in the Sahel countries, and some is used in livestock feed and the agri-food industry.

Japan is not allowed to re-export this rice that it was required to import. In 2008, further to the crisis on the world rice market, two experts, Tom Slayton and Peter Timmer, suggested that the United States government, the main supplier of rice to Japan at the time, could exceptionally authorise the Japanese government to export the part of its WTO stock imported from the United States. This permission was granted and, even before Japan could begin exporting this rice, the crisis came to an end on the rice market: anticipating a decrease in prices, the countries that had blocked their exports removed the bans, and those that were seeking to import rice at any price decided to wait. Consequently, the rice price rapidly returned to an acceptable level.

If the current crisis were to spread to the rice market, the same measure, in other words authorising Japan to export its WTO stock, could be taken by Japan's main suppliers.

Preventing future crises

New crises will occur on world markets. It is even expected that they will increase in frequency and intensity. This is why the two levers proposed, for biofuels and the Japan WTO rice stock, could be automatically activated when a price crisis occurs on international food markets.

Regulating the use of grains and vegetable oils to produce biofuels – When the international price of maize or rapeseed oil exceeds a predetermined level, using grains or vegetable oils to produce biofuels could be limited or banned. This would mean supplementing the current system of biofuel mandates with a symmetric system. Such symmetry would be fully justified: given that biofuel mandates provide agricultural producers with protection against price reductions (the floor prices observed, [see box below](#)), it would be legitimate to ask them to accept a ceiling when prices are soaring. This would imply considering the quantities of grain or oil normally used to produce biofuels as virtual stocks that can be mobilised in a crisis situation, as was already proposed further to the 2008 crisis.

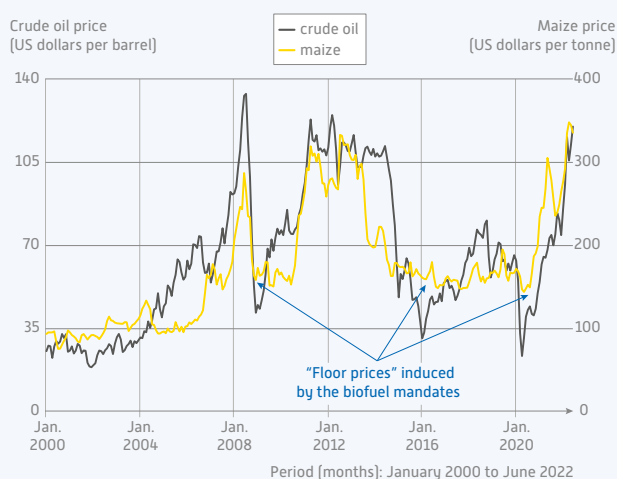
Transforming the Japan WTO rice stock into a virtual stock – Japan could immediately be authorised to export its WTO rice stock as soon as the international rice price reaches a predetermined level.

These two mechanisms amount to automatically applying the measures recommended to manage the current crisis. The benefits to be expected from this automatic application are twofold: first, ensuring a rapid effect on prices, given that decisions would be instantaneous; and

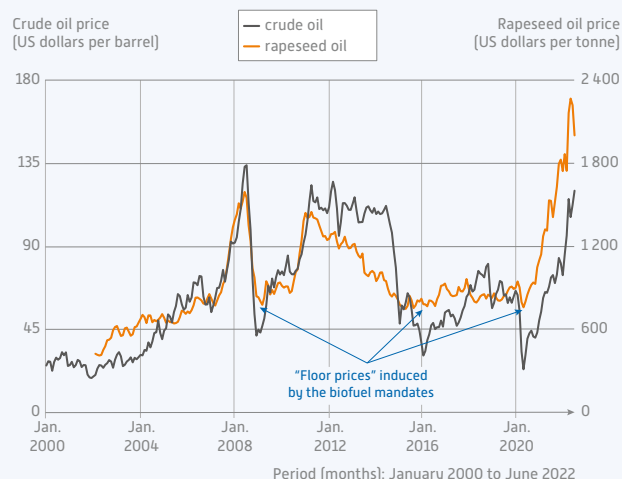
Maize and vegetable oil prices are linked to crude oil prices

3. Maize and crude oil: an asymmetric link with maize floor prices induced by the biofuel mandates (January 2000 to June 2022).

A "mandate" refers to the mandatory incorporation of a specific proportion or volume of biofuels into fuel sold at the pump.



4. Rapeseed oil and crude oil: an asymmetric link of the same type (January 2000 to June 2022).



Source of figures: The World Bank, 2022. Commodity Markets. <https://www.worldbank.org/en/research/commodity-markets>

second, making intervention measures fully predictable for market stakeholders.

In conclusion, for the current crisis as well as for future crises, the keys to these two levers are largely in the hands of the United States and the European Union.

To ensure their long-term use, commitments could be formalised by a WTO agreement. This seems relatively

straightforward for the Japan WTO rice stock, since it concerns rules made by this organisation. But it could also be considered in order to regulate the use of grains and vegetable oils for biofuel production. This would ensure these commitments are binding and make it possible to mobilise the WTO Dispute Settlement Body (DSB) to guarantee their effective application. ■

Perspective n°59 is based on research conducted in the context of the Joint Research Unit MoISA (Montpellier Interdisciplinary Center on Sustainable Agri-food Systems, <https://umr-moisa.cirad.fr/>) with its partners.

Below is a selection of publications by the author on this theme:

Galtier F. 2022. Nous pouvons (et devons) stopper la crise sur les marchés internationaux. Fondation pour l'agriculture et la ruralité dans le monde (FARM), blog post, 13/06/2022. <https://fondation-farm.org/crise-alimentaire-securite-mondiale/>

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European Commission (report coordinated by Galtier F., and written by Galtier F., Dorosh P., Belik W., Almeida Cunha A., Alpha A., Pémou B., Blein R., Rashid S., Alemu D., Timmer P. C., Onyekwena C., Clarete R., Hathie I., Chapoto A.), 2018. Using food reserves to enhance

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Some links

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Courteau R., Fugit J.-L., 2020. L'agriculture face au défi de la production d'énergie. Paris, Office parlementaire d'évaluation des choix scientifiques et technologiques (OPECST). Rapport n° 3220 déposé à l'Assemblée nationale le 16 juillet 2020. Rapport n° 646 déposé le 16 juillet 2020 au Sénat, 191 p. <https://www.senat.fr/notice-rapport/2019/r19-646-notice.html>

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Slayton T., Timmer P., 2008. Unwanted Rice in Japan Can Solve the Rice Crisis—If Washington and Tokyo Act. CGD Notes (May 09, 2008), Washington, DC, Center for Global Development. <https://www.cgdev.org/publication/unwanted-rice-japan-can-solve-rice-crisis-if-washington-and-tokyo-act>

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Wright B., 2009. International Grain Reserves and Other Instruments to Address Volatility in Grain Markets. *Policy Research Working Paper* 5028, World Bank, Washington, DC. <https://doi.org/10.1596/1813-9450-5028>

A few words about...

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