Is there any reason why agricultural prices should remain high in the long term?

Long-term price trends for agricultural commodities regularly expect a rising demand and high prices. But this might be a too optimistic point of view.

Whenever long-term trends in prices for wheat, maize or soya are under discussion, experts and farmers as well as the general public seem to refer automatically to the globally rising demand – ever greater numbers of people will have to be fed, and thanks to rises in real incomes they will consume ever more animal protein. And in such an environment – according to the widespread view – prices can be expected to remain high. For example, the OECD predicts that by the year 2023 wheat prices will be approx. 270 USD/t. That would be an increase of approx. 120 USD/t or almost 100 % compared with the levels before the start of the most recent agricultural boom. That would indeed be an epoch-making change.

Confident that in the last few centuries it has been customary to treat bearers of bad news a little more gently than used to be the case, our author has compiled a series of facts and considerations on this topic. According to these it is not very likely that prices will remain as high in the long-term as the OECD and others forecast.

1. Global growth in demand is slowing down

Yes, global demand for agricultural products is still rising, but the rates of increase will decline. Whereas in the period 1970 to 2007 demand increased by 2.2 % a year, the FAO forecasts a dip in the annual growth rate to 1.4 % for the period 2007 to 2030. And between 2030 and 2050, it is expected that the rate will drop further to then 0.8 %. Essential causes for this reversal in the trend are considered to be:

- slowing down of population growth rates,
- ever more people already consume so much food that even with rising incomes, their demand will not increase perceptibly, and
- there will be a growing share of older people, who regularly consume less food than younger people.

Even if these forecasts are attended by considerable uncertainties, it still does not appear very plausible to assume that future demand could lastingly rise more steeply than in the past.

2. Bushel-barrel correlation does not help agri-markets

So if the demand for food is not manifestly rising, what about the demand for bio-fuels? Indeed, research institutions worldwide assume that this sector will grow. However, the two key drivers to date, the US American and European bio-fuel policies, will probably be lost for the time being when the talk is of expanding this sector. The political resistances are too great, whether because of the world food supply situation or because of the questionable benefit for climate policies. And at crude oil prices of 60 USD/barrel, it is likely to become increasingly more difficult for politicians to mobilize the necessary subsidies.

Looking at crude oil prices, the second possible driver for greater demand for bio-fuels – the market economy – is not taking effect either. As long as fossil energy sources are so cheap, investors are unlikely to put their money into bio-fuel production without compulsory admixture or tax exemptions as well. Rough calculations indicate that at maize prices of 150 USD/t, crude oil would have to cost at least 90 USD/bbl in order to be able to operate such plants profitably in the USA.

3. Global supply potentials are higher than is frequently thought

The most important source for rising supply is the still untapped yield potentials. Estimates assume that e.g. the global wheat yields could be over 40 % higher if farmers were provided with the right inputs and the necessary know-how (N.B. India and China are by far the most important wheat producers on the earth). Even higher unexploited potentials have been determined across the globe for the other key crops such as maize or rice.

Arable land is scarce worldwide – a popular hypothesis. However, the opposite is the case. Estimations by the international agricultural research institute IIASA come to the conclusion that worldwide there are still at least 700 million hectares of good arable land that have so far not been used at all or only well below their agronomic potential. This amount corresponds to almost 50 % of the arable land used today. Brazil and Argentina alone could mobilize an additional 70 million hectare in the short term – without chopping down even one square metre of rain forest.

4. Intermediate conclusion – what counts are the higher f.o.b. costs

Against this background, it appears very probable that global agriculture will continue to manage in future too to do what it has been doing since the start of agricultural price reporting – to allow supply to grow more strongly than demand. And this means that in the long term agricultural prices will (a) follow the costs of production and transport, and (b) continue to drop in real terms – in other words when adjusted for inflation.

Looking at future developments, the question that consequently arises is whether there have been or will be significant cost increases in worldwide agricultural production that make it appear justifiable to count on sustainably higher agricultural prices. In the following sections the possible essential cost drivers are discussed and as far as possible quantified with the aid of figures from the *agri benchmark* network. What is important here is that the costs of the "marginal supplier" are relevant, in other words the costs of those farmers whose products are just about needed to cover global demand. Wheat production figures are outlined below by way of example – they also apply in this manner or similarly for maize or rice.

First of all, however, it must be explained that rising costs do not necessarily lead to higher prices because the lease costs act as a buffer.

5. Land costs as a buffer for rising production costs

Farmers pay to lease land because with it they earn a ground rent – the difference between the costs and the proceeds. The higher the difference, the higher the ground rent and – as a general trend – the higher the lease costs. Conversely, however, this also means that if the ground rent drops sustainably for everyone, the lease costs will also drop in the long term (at least in places where lease markets function).

And *agri benchmark* figures confirm that lease costs – if they are spread per metric ton (tonne) of wheat – are substantial throughout the world. They amount to USD 60 to 100 per tonne of wheat. This means that if the profitability of arable farming deteriorates due to rising costs, land owners will in the long term bear at least a part of these costs in the form of declining lease prices – and not the consumers of the agricultural products.

6. Higher transport costs due to migration of arable farming to more remote regions

Transport costs are a quite essential cost factor for international agricultural markets. For example, in Brazil it costs over USD 100 to convey one tonne of soya from Mato Grosso to the port – around 2,000 km by truck. By way of comparison, in the USA the same transport distance costs only approx. 40 USD/t because the grain is carried in barges along the Mississippi.

If more remote regions are developed as a consequence of the global rise in demand for agricultural products, transport costs will rise. Assuming that production is shifted by 500 km, the costs carriage paid to the port would rise by approx. 30 USD/t for the new "marginal suppliers" under presumably similarly unfavourable conditions as in Brazil.

7. Higher energy and raw material prices lead to cost increases

Producing wheat or maize is relatively energy-intensive, not only because of the use of diesel fuel, but above all because of the nitrogen requirements. Furthermore, other raw materials (phosphorous and potassium) are bought in and prices of these have also risen, in some cases steeply, in the recent past. According to agri benchmark figures, the share of the energy-related costs defined in this way amounts to approx. 35 % of total production costs (excluding land costs) at present-day prices. For example, since the start of this century energy prices have increased from 20 USD/barrel to 100 USD/barrel in the year 2012. For a while, the price of phosphorous had increased by over 300 %. On the basis of agri benchmark calculations, this led to a rise in production costs for wheat of approx. 35 USD/t.

If crude oil prices remain at the current level of 60 USD/barrel or even less in the long term and if the other raw materials also display sustainably lower prices, the increase in costs determined above – and hence the need for higher prices – would be reduced accordingly.

8. Low-yield locations make poorer use of inputs and therefore lead to higher production costs

It is hypothesized that low-yield locations lead to comparatively poor productivity of inputs such as seed, fertilizer or plant protection agents and thus to an increase in direct costs. To the extent that worldwide agricultural production will need to be panded such sites in order to satisfy demand (keyword: Siberia), the costs would also increase.

Indeed, the *agri benchmark* figures show that at a yield level of 1.5 to 3 t wheat per hectare, farmers in Australia, Canada or the Northern USA work with higher direct costs than in Germany, France or the United Kingdom. In the case of wheat, the cost-disadvantage is approx. 25 USD/t. However, these cost disadvantages are compensated by the lower costs of work performance.

Furthermore, it should be pointed out that in the past land use has chiefly been expanded to the good arable sites in Brazil or Argentina. Arable farming in Siberia has still not gained any momentum because of the high transport costs and the consequently very low farm-gate prices. Therefore this effect was not taken up again in the final considerations.

9. Intensifying production can lead to rising unit costs

One theoretically conceivable cause of rising unit costs in arable farming is the intensifying of production. If just one factor is varied – e.g. nitrogen – it is to be expected that the law of reducing growth in yield will take effect and consequently the average nitrogen productivity will decline if the use of nitrogen increases. Consequently the unit costs would then increase too.

These effects are not reflected in the *agri benchmark* figures. No connections of any kind can be found between the intensity (measured in fertilizer application, plant protection agent use per hectare) and the production costs. However, in a comparison of different production systems the complete factor input – machinery, labour, variable inputs –varies. Theoretically speaking, different production functions are compared.

Further targeted studies would be necessary In order to clarify these possible effects conclusively. However, it should be considered that presumably only short-term increases in costs are involved, because in the long term – as the *agri benchmark* figures indicate – there will be complete reorientation of the production systems and not just expansion of the use of one production factor. And then – so it is supposed – rising unit costs would in no way necessarily be expected.

10. Conclusion: In the foreseeable future, agricultural prices will no longer drop back sustainably to the level preceding the 2007/08 boom. The cost increases are too clear in some areas for this to happen. However, it is equally implausible to assume that they will come to rest permanently at USD 270 (or € 220) per tonne of wheat.

Adding up the figures set out above, increased use of more remote regions and a rise in prices for energy and nitrogen will lead to an arithmetical rise in costs of approx. 65 USD/t wheat. If energy and raw material prices remain permanently low, this amount would be reduced by a further 10 to 15 USD/t.

Critics may object that it should be considered that developing new site locations involves costs too – land reclamation and cultivation, possibly liming etc. In response one could point out that the expansion to date in Brazil or Argentina in the pre-boom phase occurred even without very high price incentives. And such locations display a quite decisive advantage – the land costs are very low.

In view of the globally significant importance of leasing, it is to be assumed that at least 50 % of the increase in costs determined above will be borne by landowners as they will (have to) accept lower lease payments. In a worldwide comparison, this assumption is very conservative, as in countries such as the USA the lease prices are coupled much more closely with the profitability of arable farming. By comparison with the pre-boom phase, wheat prices would accordingly rise in the long term by 30 to 35 USD/t to then approx. 180 USD/t or 150 €/t.

Even if one may (and should) doubt details of the considerations and calculations set out above, it does not appear very plausible to assume that the global agricultural prices could remain permanently at a level of 270 USD/t wheat.

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This position paper is based on a detailed working paper; see: http://goo.gl/RDYnHk.
The sources for the figures quoted in this text can be found there.