

A new Paradigm for Global Agriculture Commodity Markets?

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Concerning long-term trends in prices for wheat, corn, or soy, it is a commonplace for analysts as well as farmers to point out the globally increasing demand: More and more people will have to be fed and because of increasing real per-capita incomes, they consume more and more animal protein. The common opinion is that under those circumstances prices will have to remain high. Thus, the OECD predicts wheat prices of about 270 USD/t by 2023. That would be approximately 120 USD/ or about 100% more than prior to the beginning of the boom in agriculture – and consequently an epochal change.

Trusting in the fact that during the last centuries, bearers of bad news were treated a bit better than they had been earlier in history, our author collected a series of facts and considerations about this topic. According to these, it is unlikely that the prices remain as high as predicted by the OECD and others.

1. Growth of global demand is declining

Yes, the global demand for agricultural products is still increasing, but the growth rates will decrease. Whereas, in the period from 1970 to 2007, demand still grew about 2.2 % annually, the FAO predicts a decrease of the annual growth rate to 1.4 % between 2007 and 2030. It is expected to slow further to 0.8 % between 2030 and 2050. The following points are seen as the most important reasons for the reversal of this trend:

- Decreasing growth of population
- More and more people's diets have reached their saturation level so that their demand will not grow significantly, even if the incomes will rise, and
- Growth in the percentage of elderly people, who tend to consume less food than younger ones

Even if these forecasts are subject to considerable uncertainty, it does not seem to be plausible that future demand could continue to increase more than in the past.

2. Bushel-Barrel correlation will not help the agricultural markets

If the demand for food does not increase significantly, could the demand for bio-fuels rise? Indeed, global research institutions predict growth in this sector. But when talking about an expansion, the US and European biofuel policies, which

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have been the main drivers until now, could drop out for the time being: Political resistance because of the competition with global food security or the questionable value of biofuels as a means to mitigate climate change are too strong. And with crude oil prices of 60 USD/barrel, policies will hardly be able to mobilize the necessary subsidies.

Regarding crude oil prices, it is not likely the market forces will serve as a driver for stronger demand for biofuels. As long as fossil fuels are still reasonably priced, it is unlikely investors will enter the production of biofuels without additional a mandatory blending or a tax exemption.

Rough calculations show that to operate biofuel plants economically in the US, with corn prices of 150 USD/t, prices for crude oil have to be at least 90 USD/bbl.

3. Global supply potentials are higher than frequently estimated.

Untapped yield potentials remain the most important source for increasing supply. Estimates assume that, for example, global wheat yields could be more than 40 % higher if farmers had the correct inputs and the necessary know how available (N.B.: India and China are by far the globally most important producers of wheat). For other important crops such as corn or rice, the untapped yield potentials are even higher.

A popular hypothesis is that the supply of arable land is short. But, in fact, the contrary is true. Estimates of the international agricultural scientific institute IIASA show, that worldwide, there are at least 700 million hectares of good arable land still not used at all or far below their potential. That amounts to about 50% of current arable land. Even without touching a single square meter of rain forest, Brazil and Argentina could mobilize additional 70 million ha in the short run.

4. Interim conclusion: Only an increase in fob cost would lead to higher global commodity prices.

Against this background, it is probable that global agriculture will manage, in the future, what it has done since the beginning of the recording of agricultural prices: supply growing faster than demand. Consequently, in the long run, agricultural prices will (a) follow the cost of production and transport and (b) decrease in real terms – i.e. inflation adjusted.

Regarding future developments, the question arises whether there have been or will be significant increases in cost in global agricultural production that will lead to higher agricultural prices in the long term. In the following sections, possible important cost drivers will be discussed as well as quantified with the help of figures from the network *agri benchmark*. For this, it is important that cost of the marginal supplier (farmers whose products are barely needed to meet global demand) is relevant. In the following, figures regarding the wheat production are outlined – they are similar or even identical for corn or rice.

First, it has to be recognized that increasing cost will not necessarily lead to higher prices because land rents serve as a buffer.

5. Cost for arable land as buffer for increasing production cost.

Farmers pay rent because they generate a return to land: the difference between cost and revenue. The higher the difference is, the higher will the return to land be and – as a tendency – the higher the rents. Conversely, that means, in the case of decreasing returns to land for all, rents will decrease in the long run (at least in places with working rental markets).

And figures of *agri benchmark* prove that when applied to tons of wheat, the respective cost is considerable – globally they average 60 to 100 USD per ton of wheat. In other words, if the economic situation of arable farming deteriorates, landlords will have to pay at least a part of these costs in the form of decreasing rents – and not the consumers of the agricultural products. This is a development we can already observe in the US for example.

6. Higher transport cost because of the expansion of arable farming into more remote areas.

For international agricultural markets, transport cost is an important factor. E.g. in Brazil to truck a ton of soy about 2,000 km from Mato Grosso to the port costs more than 100USD. In comparison: The same transport distance in the US costs only about 40°USD/t because commodities are transported with inland vessels on the Mississippi River.

Provided in order to expand the global supply for agricultural commodities more remote areas are coming into production, the transport cost will rise. Assuming, the production is expanded by 500 km away from the nearest port, fob cost for the new marginal producer under (poor) conditions similar to those in Brazil would increase about 30 USD/t.

7. Higher prices for energy and fertilizers will lead to increased cost.

Not only the use of diesel, but even more importantly, the needed nitrogen fertilizer makes the production of wheat and corn relatively energy-intensive. Furthermore, other raw materials (phosphorus and potash), whose prices recently have risen remarkably, have to be bought. According to figures of *agri benchmark*, the portion of total production cost (not including land cost) represented by energy- and fertilizer related cost defined this way at today's prices amounts to approx. 35%. Energy prices, for example, have risen from 20 USD/barrel at the beginning of the 2000s to 100 USD/barrel in 2012. Prices for phosphorus temporarily increased about 300%. This led to an increase in cost of production for wheat of about 35 USD/t basing on calculations of *agri benchmark*.

Should prices for crude oil remain at today's level of 60 USD/barrel or even lower and should the other inputs mentioned be lower in the long run as well; the

above determined increase of cost – and at the same time the necessity for higher prices - should deteriorate accordingly.

8. Low-yielding sites are not as efficient in input usage and therefore lead to higher cost of production.

The hypothesis made is that low-yielding regions lead to a comparably low productivity of inputs such as seeds, fertilizer, or plant protection products and thus to increasing direct cost. Cost will increase to the same extent as the global agricultural production will have to be expanded to meet the demand (keyword Siberia).

In fact, *agri benchmark*'s figures show that farmers in Australia, Canada or in the north of the US with yield levels of 1,5 to 3 t of wheat/ha operate with higher direct cost than those in Germany, France or Great Britain. For wheat this cost disadvantage amounts to approx. 25 USD/t. However, these cost disadvantages are compensated by lower cost for operations (labor, machinery and fuel).

Furthermore, it should be noted that in the past the expansion in arable land primarily took place Brazil or Argentina at high potential sites. Because of high transport cost and therefore low farm-gate prices, arable farming in Siberia is not gaining momentum. For this reason, the effect of an increased use of low yielding sites as a possible driver for global commodity prices will not be discussed again in the final conclusions.

9. Intensification may lead to higher prices

A theoretical reason for increasing prices in arable farming is the intensification of production. When one considers just one factor, e.g. nitrogen, it is to be expected that the law of diminishing return will come into effect and thus, the average productivity of nitrogen will decrease as the use of nitrogen rises. In consequence, the cost of production will increase, too.

These effects cannot be found within the figures of *agri benchmark*. It is not possible to detect any interaction between the intensity (measured in the form of use of fertilizers; use of plant protection per ha) and cost of production. But when comparing different wheat production in e.g. United Kingdom, Brazil or Australia the use of all production factors – machines, labor, and variable inputs – is modified. In theoretically terms: We are comparing different production functions rather than analyzing different points on the same function..

To reach a final conclusion of these possible effects, further targeted analysis would be necessary. However, even in case we would find an increase in cost of production with just the variation of one factor it has to be noted that this increases in cost should be temporarily, as according to figures of *agri benchmark*, production systems are completely revised on the long run and not only the use of a single production factor will be extended. Consequently, it is assumed that increasing prices are not necessarily to be expected.

- 10. Conclusion: in the foreseeable future, agricultural prices will not drop to the level prior to the boom of 2007/08. The costs in different areas have increased significantly. But it is as implausible to assume that they will remain in the long run at 270 USD per ton of wheat.**

The increased expansion to remoter areas and the increase of prices for energy and fertilizers result – when adding the above-mentioned figures – to a calculated rise in cost of approx. 65 USD/t of wheat. Should energy and commodity prices remain low, this sum will be reduced by about 10 to 15 USD/t.

It might be objected that the cost for the development of new sites – cultivation, possible liming etc. have to be taken into consideration. It should be countered that the massive expansion of land use in Brazil or Argentina prior to the boom took place without very high price incentives, too. And those sites have a decisive advantage: cost for the arable land is very low.

Considering the significant global importance of rents, it is to be expected that at least 50 % of the above calculated increase in cost will be born by the landlords through lower rents. Globally, this assumption is very conservative, as in countries such as the US, rents are linked much more closely to the economy of arable farming. Compared to the time prior to the boom, wheat prices could rise, in the long run, by about 30 to 35 USD/t to then approx. 180°USD/t.

Even if one can (and should) critically discuss about details of the presented considerations and figures, it does not seem to be very plausible to assume that global agricultural prices could remain in the long run at a level of 270 USD/t of wheat.