

# Agricultural economics and rural policy

Soaring food prices frequently dominate the world news. High prices are often associated with increasing hunger and reduced nutrition security. The relationship between food prices and security varies with time and place, however.

**F**ood prices are determined by supply and demand. Supply and demand, however, hardly react to price changes, both are price inelastic. Conversely, small shifts in demand or supply lead to substantial changes in market prices. As demand increases – through population growth and higher disposable incomes – prices rise very quickly. The same is true if the supply decreases, for example as a result of crop failures.

## Reversed process

Food production has grown faster than global food demand over the past 50 years, explaining the downward trend in food prices up to 2000. However, since early 2000s this process has reversed. The export price of some conventional crops has approximately doubled between 2003 and 2008, according to figures from the FAO. This is not due to lower production. The FAO and the OECD expect that the increase in food production (2.3 percent per year) will remain ahead of the world's

population (1.0%) until 2021. Other drivers of demand growth, such as increases in wealth and demand for biofuels and livestock feed, are therefore important explanations for the observed price increases.

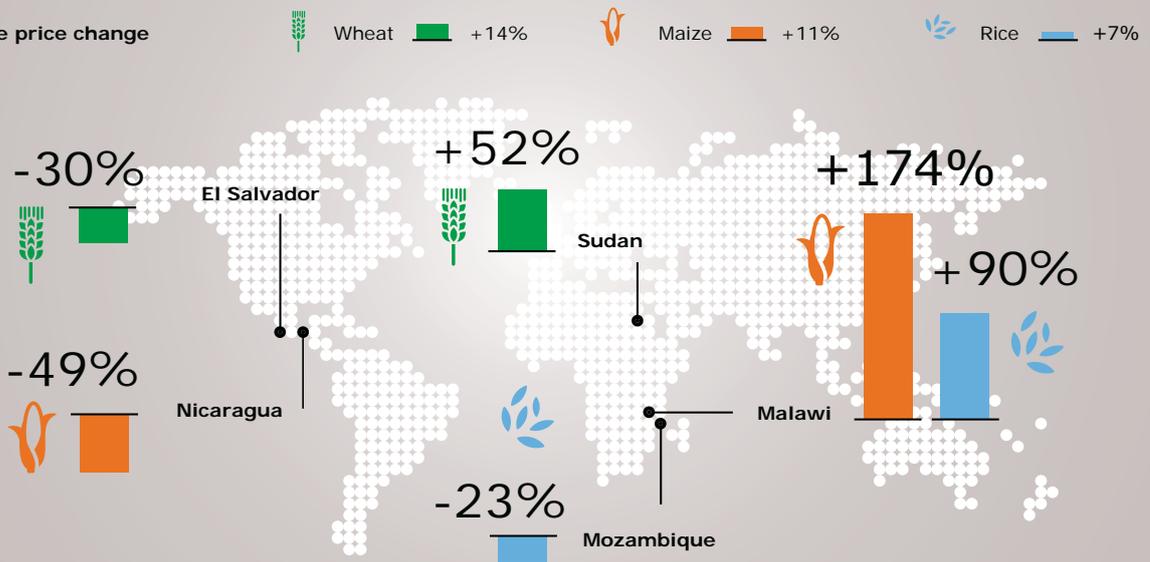
The effects of fluctuating food prices are not the same for every country and individual. When the prices of maize, wheat and rice rose sharply in 2008, there were worldwide protests, leaving several dead and wounded in places such as Cameroon. In Haiti, Egypt, Mauritania and Mozambique, demonstrations against high food prices led to looting and clashes with the police. Thailand and Pakistan deployed the army to monitor food warehouses. High food prices caused hunger and poverty in these low-income countries.

Things remained quiet in our region, as in the rest of the developed world, where the amount that people spend on food is relatively low. In the Netherlands,

## Changes in the price of food crops

at various locations around the world between July 2011 and July 2012.

Average price change



Source: FAO and GIEWS, 2012



## Growth food prices

### Food Price Index

an indication of relative international world food prices.  
2002-2004 = 100

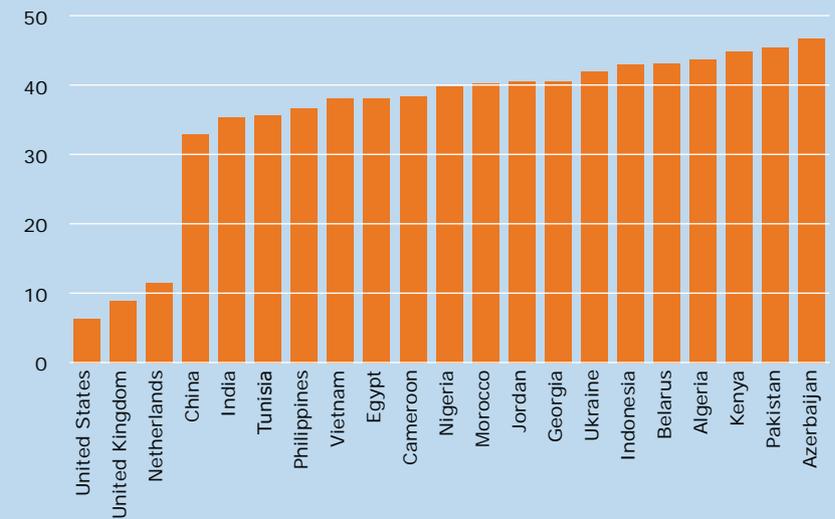
There are several different indicators for world food prices. The FAO and the World Bank both regularly publish statistics, including a food price index based on export prices of a number of commonly traded food crops. Both institutions report for 2012 that food prices are about as high as they were in 2008. That is twice as high as the average between 2002 and 2004. The World Bank reported record prices for maize and soya this summer of 2012.



Source: FAO



### Percentage of income spent on food



Source: USDA, 2011

about 14 percent of our total household budget is earmarked for food. Moreover, the cost of primary foods – grain, sugar, etc. – only partly determines the price of the final product. Marketing, transportation, processing and trading costs are all important components of the consumer price. All of these elements dampen the impact of prices on the world food market. The increased use of food banks in Western countries is largely the result of other problems, such as a loss of jobs and income, high housing costs and debt.

### Consuming less

In developing countries, poor households spend a large part of their income on largely unprocessed food. People thus respond to higher food prices by consuming less food or skipping more expensive and nutritious foods, such as meat and vegetables. They base their diet increasingly on staple crops like grain and sugar. (Food) poverty in these countries varies geographically. Local conditions – harvest, stockpiling, policies – determine the food prices, which are not

Mozambique. Wheat was 52 percent more expensive in Sudan and 30 percent cheaper in El Salvador. Maize costs 174 percent more than a year earlier in Malawi, while its price fell by 49 percent in Nicaragua. The overall impact of the global price on the prevention of hunger appeared limited, partly because local prices barely changed in China, India and Indonesia.

### Price effect biofuels

In addition to supply, demand is also relevant. In this regard economists do not just look at the current situation in the food market. Although the exact effect is difficult to determine, speculation – i.e., the trader and the farmer agreeing on a price before the harvest, giving the farmer security and the trader an opportunity for higher profit – can have an impact on food prices as well. A minor part of the increase in demand is currently driven by biofuels. Food crops such as maize and sugar are used for the first generation of biofuels (the proportion of the food crops being converted into energy is relatively small,

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always in line with the world market and prices. Research of Koos Gardebroek, associate professor of agricultural economics and rural policy, shows that, even within a region, prices may react differently to global price fluctuations. The further a place is from major commercial centres, the greater the impact of local conditions. This may mean prices rise or even fall less rapidly. However, it can also cause the price shock to be that much greater.

The magnitude of the differences in price fluctuations was established in research by the FAO. While the price of rice, maize and wheat on the world market increased by 7, 11 and 14 percent respectively between 2011 and 2012, the price of rice increased by 90 percent in Malawi and fell by 23 percent in

however). Since this market is growing – due among other things to compulsory requirements by governments in Europe, the US and Brazil – it creates an upward pressure on prices.

The negative effects of high food prices – poverty, hunger, political unrest – have a flipside. Medium-term nutrition security may benefit from relatively high food prices, as they encourage farmers to increase production. Furthermore, as farmers profit from higher yields, they can invest in fertiliser and other inputs to increase production. It also becomes more attractive to use fallow land. In the long term, high food prices can lead to increased spending on R&D in agriculture as it is expected to be recouped quickly. ■

## *Biobased economy: getting more out of biomass*

Agriculture and nature management are increasingly linked to other economic sectors through the development of the biobased economy. Deploying green raw materials (biomass) as components in chemical products and in energy production opens a whole new world of possibilities for the use of biomass and the gradual replacement of fossil fuels (coal, oil, natural gas). But how do we guarantee food safety in such a biobased economy?

The new biobased production-consumption chains start with plant production of biomass in agriculture, horticulture and forestry, and with the organic waste released during agricultural production and nature management and in household waste. These green raw materials can be processed into components for food, feed and biobased products (chemicals, materials and energy) through biorefinery. The attraction of this approach is that it makes use of as much of the plant as possible. Naturally, this requires that sufficient plant material always be available as green manure in order to maintain the quality of the soil.

### *New biorefinery*

Using biorefinery technology currently in development, the rich complex composition of biomass can be converted into a wide range of products. New biorefinery processes strive to use the complex (molecular) structures of biomass in the best possible way. The available functional compounds can then serve as chemical building blocks for semi-manufactured and end products. The main difference with petrochemical refinery is that molecular structures are not completely broken down to the simplest small molecules, which then need to be made functional again. In biorefinery, however, the functional groups remain intact, which saves energy and power consumption across the production process.

Wageningen UR provides an important contribution to the development of the biobased economy in an integrated manner. In this context, Wageningen UR cooperates with knowledge users, work on new custom crops, and develop new biorefinery process technologies together with industry. We also generate knowledge for use by policymakers and support the public debate with factual information. Our knowledge users are both governments and international

companies in the chemical industry, materials production & processing, electricity & fuel production, and the agricultural, food and horticulture sectors.

Within the Biobased Economy research programme of Wageningen UR, the biorefinery concept connects the various biomass sources, conversion processes and chain development to the various applications. Biorefinery and biobased value chains are developed and applied at a local, regional, national and global scale. Wageningen UR charts the opportunities and barriers on each level and develops the technological knowledge required to achieve new biobased value chains. This knowledge development and the related

### *New biorefinery processes strive to use the complex (molecular) structures of biomass in the best possible way*

opportunities and restrictions, are relevant to technology, logistics, process-related product development and the economy, as well as in the field of social embedding. Sustainability issues always play an important role and there is a necessity for extensive cycle closure in all cases.

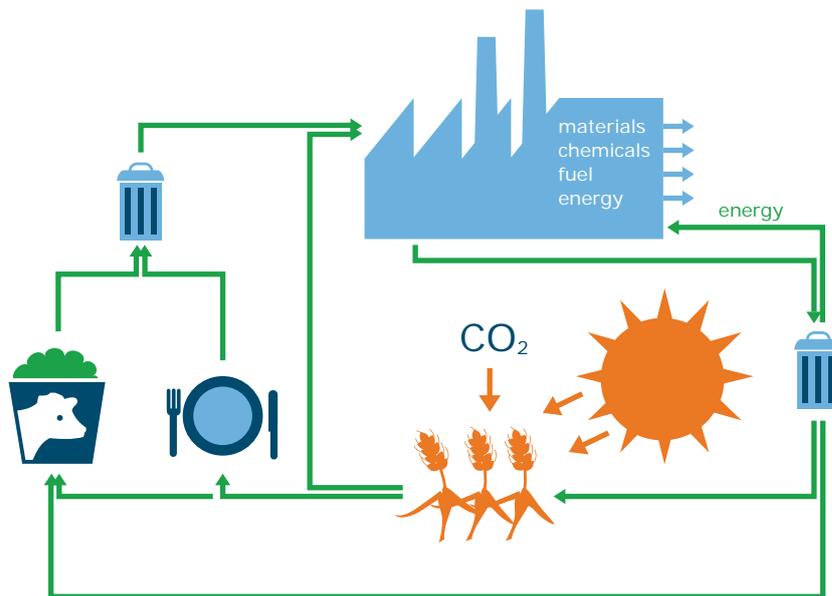
### *Optimised cooperation*

The development of the biobased economy will be finalised through the production and sale of biobased products. This will ultimately occur via optimised cooperation between the production of food, feed, biobased chemicals, materials, biofuels and energy. This is why Wageningen UR's R&D programme is focused on innovation and market implementation. Many scientific questions involving biorefinery, bio-based chemicals, materials & energy, specific crops and soil quality are relevant within this R&D programme. There are also issues related to economic knowledge: Economic feasibility and development of business cases, competing claims, changes in land use, and environmental issues such as the development of sustainability indicators, related greenhouse gas emissions and risk assessment for new biobased chains. In terms of food production, economic development constitutes an important issue. While food and feed have a high value in the sustainable biobased value

chain, there is also a large and growing market for other biobased applications. It is necessary to ensure that sufficient biomass is produced and available for food. The task for agricultural and horticultural producers is to realise a level of production of a sufficiently sustainable and high quality to satisfy current and future food needs. At the same time, the sector faces the challenge of optimising the

production of biomass to allow the greening of the fossil fuel economy. Wageningen UR supports this process, among other things as a co-developer of production in integrated biorefinery concepts, where non-edible components and residues are processed into quality products in chemicals, materials and energy production.

### Biobased economy



The Biobased Economy is an economy in which food, feed, chemicals, materials, transport fuels, electricity and heat are produced economically and sustainably from green resources: resources that are renewable.

Biofuel production



Lignocellulose-rich crops, such as the fast growing miscanthus, produce biomass suitable for refinery processes.

