Effects of high prices on Farming systems across the European Union

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Introduction

Prices of agricultural commodities have peaked in the period 2007 to the middle of 2008 (FAO, 2008), following years of sub-average yields in important production regions and higher demand for livestock products as a result of economic development as well as increased biomass use for bio-fuel production. Despite current rather low prices, a return to prices above long term trends after macroeconomic recovery is possible and several experts (OECD, USDA) argue that this is likely to happen in the medium-long term. Continuing higher prices for agricultural commodities would be a real trend break and unprecedented since the introduction of the Common Agricultural Policy (CAP) in the European Union. It raises new questions regarding the reform of the CAP (EC, 2008). Interesting questions related to the possible high prices for agricultural products in the future are: (a) what effects do high prices have on agriculture in the European Union as a whole and how do regions that differ with respect to agricultural productivity and production orientation, respond to this new economic environment?; (b) will a sustained price increase for key agricultural commodities lead to further intensification of agricultural production and which environmental consequences may arise from this for the EU as a whole and in specific "problem regions"?

Methodology

The SEAMLESS-IF approach (Van Ittersum et al., 2008) is applied in this study to analyse the effects of sustained high product prices on European agriculture. SEAMLESS-IF (being further developed within the SEAMLESS Association, see http://www.seamlessassociation.org/) has been designed for integrated assessments of policy impacts and technological innovation on agriculture, using knowledge from different scientific fields and being suited to do analyses at different scales. The model chain applied in this study consists of the agricultural sector model CAPRI (Britz et al., 2008) and the bio-economic farm model FSSIM (Louhichi et al., 2010), and makes use of a pan-European integrated data base (Janssen et al., 2009). The model chain is applied for a Base year (i.e. year 2003), mainly for calibrating FSSIM on the observed cropping patterns, and is next applied to a Baseline and 4 high price scenarios for the year 2013. These scenarios consist of shocks given to the CAPRI market model that lead to increasing commodity prices. In Scenario E1, a shortfall of supply in Australia due to water scarcity is simulated. Scenario E2 addresses an increase in the international raw oil price. Increasing demand from evolving countries like China and India as well as stronger demand for biofuels are tackled in scenario E3. The last scenario (E4) combines a global shortfall in the production of agricultural commodities with a global increase of food demand. The resulting price increases from scenario E4 are then taken over to the FSSIM model in order to assess the impact of increased prices on different farmtypes in 15 regions across the EU.

Results and discussions

Table 1 gives the average European market prices for agricultural product aggregates for the baseline as well as their relative changes in the different scenarios. The first observation is that all scenarios lead to a price increase for all shown aggregates, underpinning that the chosen parameters have an impact in the

envisaged direction. The second observation is that price increases in scenarios E1 to E3 are small, if we bear in mind that similar shocks have contributed to the high prices observed in 2007/08. However, we face here the difference between a medium term and short term equilibrium. The difference between modelled and observed results is that in the modelling all international regions can react to increased prices, being actually not possible in the short term and thus preventing enormous price increases in the modelling exercise. In other words, short term supply elasticities are much lower than the medium term elasticities as used in our modelling exercise. This explains the small effect observed in scenario E1. The supply shortfall in Australia was said to contribute a lot to the tremendous cereal price increases in 2007/08, given the global player position of Australia on world cereal markets. The modelled price increase in Europe is only about 1%. This is because in the medium term, other nations could step in to partly compensate the supply decrease of cereals. At the same time slightly increasing prices will bring down the demand for cereals.

Table 1. Mean European market prices for agricultural product aggregates for the Baseline and their relative changes for the four scenarios compared to the Baseline (2013)

	Baseline (€/t)	E1 - Supply shifts	E2- Oil price	E3 - Demandshifts	E4 - Exteme
Cereals	122	1.1%	3.9%	10.1%	38.1%
Oilseeds	247	1.6%	3.5%	17.1%	61.4%
Other crops	129	0.1%	4.7%	2.8%	23.8%
Meat	615	0.2%	3.1%	3.2%	27.3%
Dairy products	1802	0.2%	7.0%	6.6%	41.9%
Oils	1216	0.2%	3.4%	4.2%	29.4%
Oil cakes	1280	0.1%	0.6%	1.3%	7.7%

Scenario E2 shows that an oil price increase of 50% is only transferred for a small part into agricultural commodity prices while in Scenario E3 the strongest price increases can be found in the cereal and oilseed sectors. This is directly connected to the assumed increase in bio-fuel demand in Europe. Scenario E4 results in the strongest price increases (30% to 60%) for all shown categories due to the shocks being more global than in the previous scenarios. As we are particularly interested in analyzing the effects of strongly increased prices on farming systems over Europe, we take experiment E4 as starting point for performing the regional high price scenario analyses on farmtype level. Results at regional and farm type level will be presented at the conference.

Conclusions

This analysis addresses the connection between global developments on the macro level and the farm level. So far we can conclude that long term price increases are to be expected way below the peaks observed in 2007/08 but changes in supply and demand structures impact on international prices. We are currently analysing effects on farming systems in 15 EU-regions to assess effects in terms of cropping patterns and management, which in turn affect economic and environmental performance indicators.

References

Britz, W. and Witzke, P., 2008. CAPRI model documentation 2008: Version 2. URL: http://www.capri-model.org/docs/capri_documentation.pdf

European Comission (EC), 2008. Health check of Common Agricultural Policy. URLhttp://ec.europa.eu/agriculture/healthcheck/index_en.htm

Food and Agricultural Organization of the United Nations (FAO). 2008. Soaring food prices: Facts, perspectives, impacts and actions required. High-Level Conference on World Food Security: The Challenges of Climate Change and Bio Energy, Rome, 3–5 June, 2008.

Janssen, S., Andersen, E., Athanasiadis, I.N., van Ittersum, M.K., 2009. A database for integrated assessment of European agricultural systems. Environmental Science and Policy 12, 573-587.

Louhichi, K., et al, 2010. A generic Farming System Simulator In: Brouwer, F., van Ittersum, M.K. (Eds.), Environmental and agricultural modelling: integrated approaches for policy impact assessment. Springer, Dordrecht.

Van Ittersum, M.K., Ewert, F., Heckelei, T., Wery, J., Alkan Olsson, J., Andersen, E., Bezlepkina, I., Brouwer, F., Donatelli, M., Flichman, G., Olsson, L., Rizzoli, A.E., van der Wal, T., Wien, J.E., Wolf, J., 2008. Integrated assessment of agricultural systems - A component-based framework for the European Union (SEAMLESS). Agricultural Systems 96, 150-165.