Non-technical summary

Project RRC X-101
under the Global Development Network
`*Implications of biofuel promotion for a transition country*'

In this project, we fill an important research gap – we have constructed a dynamic CGE model for evaluation of biofuel promotion policy for a transition country. The gap is here since the majority of models have been applied either to advanced countries (and these models typically evaluate the effects of policy measures on these countries), or to developing countries (then the models tend to address the effects of land use competition on food prices and their consequences for poor).

To address this gap, the CGE model has been calibrated for transitional economy -- the Czech Republic. The model is characterized with three features. First, the model assumes heterogeneous households. Therefore, the model is able to analyze different impacts of policy measures on the two types of households, which is main motivation of the research. Second, the model has a detailed agricultural sector to address the competition between biofuel feedstock and food production for arable land. Third, the model contains features specific for transition economy. This is important since the real convergence in transition economies in Central Europe is characterized by permanent changes in real prices and real exchange rate appreciation. As these features permanently affects relative price, they have non-trivial effects on the dynamics of these economies. Real exchange rate appreciation, for example, lowers the relative prices of imported commodities such as oil or food and at the same time increases the relative price of exports. Therefore, the usual static CGE model would not be sufficient to consistently capture the reaction of the economic agents to shocks or policy measures in time.

There are two types of households in the model economy: the agricultural and the non-agricultural household. Both representative agents consume the final consumption good, food, motor fuels, and supply an elastic amount of labor. Both households invest to the physical capital (agricultural households to the physical capital used in the agricultural sector, why the other household to the capital used in the intermediate good sector). The physical capital is internationally immobile and is immobile also across sectors. This is a realistic feature for modeling sluggish adjustments of real economy to changes in relative prices. The non-agricultural households can also invest to the internationally traded bonds, while the agricultural households receive the income from land.

The agricultural sector is relatively complex in this model. There are several stages of the agriculture and food production; see Figure 1. First, there is a basic sector, which produces raw

agriculture products. This production is divided by the constant-elasticity-of-transformation (CET) function between biofuel feedstock and the intermediate agriculture production. This intermediate production is then divided between agriculture product exports (which are sold at the world exogenous price) and the domestic component. This division follows another CET function. The domestic component is then combined with imported agricultural products using a CES function to create the final agriculture good (food) consumed by households. The reason for the complicated structure is the need to model (i) the competition between various uses of raw agricultural production (i.e., for biofuel feedstock, for exports, and for domestic use) and (ii) the imported component of the domestic food. This nested CET structure is needed as we do not want to allow for the same elasticity of transformation between biofuel feedstock, exported agricultural products and the part of production used domestically.

We use the model to simulate and compare alternative approaches to achieving the 10% target as dictated by the Directive of the European Commission no. 2009/28/EC. We consider a gradual introduction of subsidies for biofuel feedstock products so that the target is achieved by 2020. If the subsidy is financed by the increase in labor taxes, the policy would not only cause economic distortion, but it may hurt the agricultural sector even relatively more.

If the subsidy is financed by the increase in excise tax on motor fuels (or by mandatory blending quotas, which is equivalent instrument in our model), then the distortions are alleviated and the agricultural sector may benefit from this policy measure. This shows that it is not irrelevant how the target is achieved. The reason why this scenario is more beneficent for the economy is the favorable terms-of-trade effect, which is caused by the shift from imported sources (oil) to the domestic source (biofuel feedstock). This effect would not be present if the domestic exports were very price elastic, as in this case, the terms-of-trade effect would be unimportant. However, the finding that the agriculture sector would benefit relatively more does not depend on this terms-of-trade effect.