The Economics of the Interaction of GMO and Biofuel Policies in the European Union

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In the European Union the cultivation and trade of genetically modified (GM) crops is regulated stricter than the cultivation and trade of crops produced with conventional breeding techniques. One of the differences is that GM crops need to pass a costly and time-consuming risk assessment by the European Food Safety Authority (EFSA) for authorization. After a GM crop is authorized, marketing of food products containing or processed with GMOs is affected by two types of labeling: mandatory (positive) labeling of GM products applies to all food products in the European Union containing an GM ingredient above some threshold; and voluntary (negative) labeling of GM-free products in some EU Member States (e.g., Austria, Germany, and France) applies to food products excluding not only GM ingredients (up to some thresholds) but also excluding GMOs in the production process (e.g., excluding GM feed for producing animal products).[1]

The objective of this paper is to analyze the interaction effects of labeling genetically modified organisms (GMOs) on the EU biodiesel market. On the one hand, the EU biofuel mandate reduces the area available for food cultivation. On the other hand, strict GMO regulations hamper the use of GM crops in EU Member States. Our motivation comes from the present political discussion of how to regulate a number of new plant breeding techniques (NPBTs) in the European Union. In case the European Commission considers NPBTs as conventional breeding technique, several agricultural markets will be affected differently than when NPBTs fall under the scope of the genetically modified organism (GMO) regulation. We simulate the introduction of oilseed plants produced from NPBTs on the biodiesel market. We assume that rapeseed from NPBTs are more productive than conventional breeding techniques. Our research shows that regulating NPBTs under the GM regulation reduces the inflationary effects on food prices of the biofuel policy.

We consider the case of rapeseed to show the implications of GM labeling on a crop that can be used for food, feed, and fuel. Rapeseed oil obtained from crushing rapeseed can be used for human or biofuel consumption while the byproduct rapeseed extraction meal (henceforth: meal) is mainly used as protein feed for animals (e.g., cows and cattle). We develop a theoretical model that links prices of rapeseed as well as rapeseed oil and meal, and also links the quantities through supply of oil and meal and demand for oil, meal, and biodiesel.

In the first part, we analyze the effect of mandatory and voluntary labeling on the rapeseed market holding the biofuel policy fixed. We consider three scenarios:

(1) NPBTs are regulated as conventional breeding technique and hence remains unlabeled. In the first scenario, all conventional rapeseed will be replaced by the more efficient rapeseed from NPBTs. Since NPBTs fall under conventional breeding, the market needs not be segregated.

(2) NPBTs fall under the GMO regulation and mandatory GM food labeling applies. In the second scenario, in which the higher efficiency come from a technology that falls under the GMO regulation, the model needs to be adjusted. In this scenario, demand for human oil consumption can only be covered by conventional rapeseed while biodiesel and all the meal might be either GM or conventional. The exclusion of GM oil for human consumption is due to

[1] The national voluntary labeling schemes or guidelines in some EU Member States (e.g., Germany, Austria, and France) allow firms to label their products as “GM-free”, if they exclude GMOs not only as ingredient, but also in the production process.

European retailers' "quasi-ban" of mandatorily labeled GM products such that hardly any GM food can be found in the European Union.

(3) NPBTs fall under the GMO regulation and mandatory GM as well as voluntary GM-free labeling applies. The third scenario extends the second one by also splitting up the meal supply and demand into GM and non-GM. In the case of meal, however, it is less straight forward, since GM and non-GM products are considered to be vertically differentiated and consumers prefer the non-GM product to the GM product, if offered at the same price. Therefore, the voluntary scheme led some firms to offer "GM-free" labeled products. This splits up the rapeseed meal market into a non-GM market (in which GMOs are allowed in the production process) and a non-GM market.

After setting up the equation system for all three scenarios, we analyze the interaction of biofuel policies with the labeling schemes. We look at how a change in biodiesel demand, triggered through a raise in the biofuel mandate, affects the individual markets. In particular, we are interested in whether GM labeling schemes hamper or accelerate the price increase due to higher biodiesel production. For proper comparisons of prices in the scenarios, we use weighted averages and compare absolute as well as relative price changes across scenarios.

We calibrate the rapeseed market parameters and simulate changes in biodiesel production. Similarly to Drabik et al. (2014), one of our general findings in all three scenarios is that the jointness of oil and meal production decreases the link between biodiesel and oilseed prices.

Our preliminary results show that an increase in the mandate has a larger effect on prices in the first scenario, followed by scenario two and the lowest effect in the third scenario. This lower effect on food prices in the latter scenarios implies that a stricter GMO policy may actually reduce the price effects of a biofuel mandate. However, this reduced price effect is not for free. By comparing the welfare effects of the three scenarios, we show which consumers and producers benefit and loose from the GMO policy decision.

References

Drabik, D., H. de Gorter, and G.R. Timilsina. 2014. "The effect of biodiesel policies on world biodiesel and oilseed prices." *Energy Economics* 44:80-88.