



# EU biofuel policies: Income effects and lobbying decisions in the German agricultural sector



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## ABSTRACT

European Union (EU) policymakers have persistently supported first-generation biofuels despite the clearly emerging picture of small or even negative green house gas mitigation effects. This leads to the conclusion that support is driven by other objectives, for example income effects. Against this background, the main objective of this article is to analyse the income effects of abolishing biofuel policies, as well as to explore the link between these effects and lobbying decisions taken by farmers' associations representing different groups of German farmers. Income effects are estimated for different farm types and regions, and differences between farm net value added and family farm income are analysed. To understand the link between income effects and lobbying decisions, our quantitative results are compared with the biofuel policy positions of different farmers' associations. Our results suggest that, in the long run, average income effects are small, especially if the ownership of production factors is accounted for in the income calculation. Many farms show losses if biofuel support is abolished, but others even benefit from lower rental costs and experience positive income effects. Farmers' associations seem to be able to well assess the income effects of EU biofuel policy for different types of farms.

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## 1. Introduction

In recent years, energy from biomass has been increasingly promoted as an alternative to fossil energy sources. In the European Union (EU), policymakers have fostered an increase in the share of liquid biofuels in the transportation sector. According to the EU 'Renewable Energy Directive' [18] each member state is required to ensure that 10% of total transport energy comes from renewable sources by 2020. The practical implementation of the 10% target is left to the EU member states. In Germany, the main instrument is an obligatory blending quota for biofuels with fossil fuels [37]. As a result of these policies, the share of biofuels in total EU transportation energy evolved steadily and reached 4.27% in 2010. In combination with the use of renewable electricity (0.43%), this has resulted in a 4.7% total share of renewables in transportation. Up to date, biofuels are mainly made from crops – so called first-generation biofuels [14].

EU policymakers claim to pursue several objectives with this policy: positive contributions to energy security, greenhouse gas (GHG) emission reduction and income generation in rural areas [20]. However, while legislators in the EU focus on increasing the use and production of biofuels, the economic and societal environment has fundamentally changed: due to a combination of agricultural policy reform and rising global agricultural prices, biomass has become scarce on EU markets. In addition, the true capacity of biofuels to be sustainable and climate -friendly is increasingly questioned, as increasing biofuel demand leads to rising agricultural prices and results in indirect land use change and intensification effects on a global scale. High emission reduction costs were reported [13] and shortly thereafter it was questioned whether biofuels even contribute to GHG emission reductions at all (e.g., [36]).

Despite increasing concern regarding support for first-generation biofuels put forward by a broad coalition of development and environmental NGOs, international organizations, and academic institutions, the direction followed by the EU biofuel policy seemed unaffected until recently [22]. In October 2012, the European Commission published a first proposal to amend the Renewable Energy Directive and the Fuel Quality Directive [17]

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with a directive limiting biofuels from food crops to 5% of total transport fuels. The agricultural lobby and the biofuel industry powerfully contested this amendment, and it was eventually adopted by the parliament with a number of revisions. After years of negotiations, first-generation biofuels have been curtailed to 7% of total transport fuels [2], a substantial setback compared to the original proposal.

The persistent support of first-generation biofuels by EU policymakers despite the clearly emerging picture of small or even negative ecological benefits from the policy leads to the conclusion that this policy is driven by other objectives [35]. Keeney [26] analysed the distributional effects of US biofuel policies and concluded that this type of analysis “fills an important gap that improves our understanding of how biofuel policy impacts rural welfare and by extension provides insight into the political economic impacts of potential alternatives to status quo [...] policies.”

Many studies quantify the impacts of biofuel policies on agricultural commodity prices, but without explicitly quantifying income effects. In general, it is concluded that a higher demand for biofuel feedstock will boost prices of agricultural commodities and will thereby increase income in the agricultural sector. Accordingly, an abolishment of biofuel policies is assumed to result in negative income effects.

Furthermore, only a few studies report income effects at a disaggregate level (e.g., [28]) and usually impacts on farm net value added are estimated instead of family farm income. Farm value added, however, includes wages, rents and interest paid by the farm family and does not provide explicit information on the income of the farm family.

Against this background, the objective of this article is to analyse the income effects of an abolishment of biofuel policies at a disaggregate level for the German agricultural sector. Effects are estimated for different farm types and regions. Furthermore, differences between farm net value added and family farm income are analysed. To understand the link between income effects and lobbying decisions, our disaggregated results are compared with the positions of different farmers' associations regarding biofuel policies. As a result, this article contributes to explaining associations' positions and provides insights into agricultural lobby decision-making. The structure of the paper is as follows: first, the underlying methodology and scenarios are presented. Then, quantitative results are provided and the political economic context of the analysis is explored. Conclusions are drawn in the last section.

## 2. Methodology

### 2.1. Quantitative analysis

To quantify the income effects from changes in European biofuel policies, a modelling system consisting of an agricultural sector model and a farm level model of the German agricultural sector is applied. The modelling system is described in detail in Deppermann et al. [11]. The linking of the two models allows quantification of the adjustment processes at the sectoral level and at the same time analysis of farm-group specific policy impacts at a more disaggregate level. In the following, the two models are presented briefly.

ESIM [23] is a comparative-static and net-trade partial equilibrium model of the European agricultural sector. It depicts the EU-27 at the member state level as well as the rest of the world, though in greatly varying degrees of disaggregation. Altogether ESIM contains 31 regions and 47 products, as well as a high degree of detail for EU policy, including specific and ad valorem tariffs; tariff rate quotas;

intervention and threshold prices; export subsidies; coupled and decoupled direct payments; production quotas, and set-aside regulations.

All behavioural functions (except for sugar supply) in ESIM are isoelastic. Supply at the farm level is defined for 15 crops, six animal products, pasture, and voluntary set-aside. Human demand is defined for processed products and each of the farm products, with the exception of rapeseed, fodder, pasture, set-aside, and raw milk. Some of these products enter only the processing industry (e.g., rapeseed) and others are used only in feed consumption (e.g., fodder or grass from permanent pasture). Processing demand is defined for raw milk (which is divided into its components, i.e., fat and protein), oilseeds, and inputs for biofuel production. The biofuel module depicts the production of bioethanol and biodiesel. Inputs for ethanol are wheat, corn, and sugar. Biodiesel is produced from rape oil, sunflower oil, soy oil and palm oil. Input ratios are endogenously determined by a CES function. Byproducts of biofuel production are accounted for and are used as additional feedstuff in the livestock sector. The price formation mechanism in ESIM assumes an EU point market for all products except for non-tradables (raw milk, potatoes, fodder, silage maize, and grass), for which prices result from a market-clearing equilibrium of domestic supply and demand at the EU member state level.

FARMIS is a comparative-static process-analytical programming model for farm groups [4,32,33]. Production is differentiated for 27 crop and 15 livestock activities. The matrix restrictions cover the areas of feeding (energy and nutrient requirements, calibrated feed rations), intermediate use of young livestock, fertilizer use (organic and mineral), labour (seasonally differentiated), crop rotations and political instruments (e.g., set-aside and quotas). The model specification is based on information from the German Farm Accountancy Data Network, supplemented by data from farm management manuals. Data from three consecutive accounting years is averaged to reduce the influence of yearly variations common to agriculture (e.g., due to weather conditions) on model specification and income levels. Key characteristics of FARMIS are: 1) the use of aggregation factors that allow for representation of the sectors' production and income indicators; 2) input–output coefficients that are consistent with information from farm accounts; and 3) the use of a positive mathematical programming procedure to calibrate the model to the observed base year levels. Prices are generally exogenous and are provided by market models. Exceptions to this are specific agricultural production factors, such as the milk quota, land, and young livestock. For these, (simplified) markets are modelled endogenously, allowing the derivation of respective equilibrium prices under different policy scenarios. FARMIS uses farm groups rather than single farms, not only to ensure the confidentiality of individual farm data, but also to increase the manageability and the robustness of the model system when dealing with possible data errors at the individual level. Homogenous farm groups are generated by the aggregation of single farm data. For this study, farms were stratified by region, type, and size, resulting in 628 farm groups representing the German agricultural sector, of which 467 are located in western Germany. Table 1 provides an overview of the number and type of farms represented in different regions of Germany.

In other applications (e.g., [10]) ESIM and FARMIS were linked through the exchange of solution variables (vectors of price and yield changes from ESIM to FARMIS and vectors of quantity changes from FARMIS to ESIM) until both models converged on these variables in the analysis of joint scenarios. For this study, in contrast, no significant feedback effects occurred. In fact, the models are coupled in a top-down manner, i.e., ESIM quantifies price changes resulting from the abolishment of EU biofuel policies at the sectoral

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