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A farm-level and sector-level analysis and aggregation**

Executive summary and conclusions



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Executive Summary

Cost issues present a common theme in the public debate concerning future developments of German agriculture and the Common Agricultural Policy (CAP) of the European Union (EU). Oftentimes environmental costs caused by the agricultural sector are heavily discussed. However, the efforts and expenses already incurred for environmental protection and other societal benefits by the agricultural sector are often neglected.

This is precisely what the following study aims to calculate. It presents a comprehensive analysis of the additional costs for German agriculture, which are incurred through different environmental standards and additional regulations in the EU. These additional costs are then compared to the corresponding costs of important competing non-EU competitor countries. Consequently, the goal of this study is to minimize this particular knowledge deficit; but it does not aim to compare, for example, environmental costs caused by the agricultural sector to the costs incurred through environmental standards and regulations.

First, the accessible data and information regarding the different environmental standards and additional regulations for the agricultural sector are gathered. This information is then utilized to calculate the individual costs. These calculations are conducted in a manner which allows extrapolation not only to the sectoral level in Germany, but also to a single farm level. Therefore, costs are defined as increases in production costs, as well as foregone revenue due to individual standards and regulations.

Special emphasis is placed on the costs caused by the following standards and regulations: The Water Framework Directive (WFD), the new Fertilizer Ordinance, additional plant protection regulation (specifically the EU Regulation 1107/2009 concerning the placing of plant protection products on the market), specific standards and regulations regarding animal husbandry, further costs acquired by bureaucracy and cross-compliance within the framework of the CAP, greening, and the potential changes to the Technical Instructions on Air Quality Control.

In light of the WFD, it is possible to directly allocate costs incurred through water protection for single farms, as well as associated cooperation and consulting costs. Primarily, costs for water protection (in accordance to cross-compliance) are acquired in particular through liquid manure storage facilities and fertiliser application; also, abatement expenses regarding plant protection and horticulture (especially in the context of the EU Directive 2009/128/EC on the sustainable use of pesticides), as well as costs for small septic tanks, fuel stations for on-farm use and input storage facilities in accordance with cross-compliance play a role. Cooperation and consulting costs are foremost borne by efficiency controls and also in-

curred through the necessary counselling and increasing awareness for WFD topics. In Germany, all these costs sum up to 91.96 EUR/ha agricultural land. In total, the costs amount nationally to 1.539 billion EUR.

Compliance to the Nitrates Directive presents a central cost factor within the WFD and is implemented through the Fertiliser Ordinance. This German legislation is currently undergoing a transformation. The costs incurred through the revised Fertiliser Ordinance, which became effective on June 1, 2017, are not included in the calculations of the costs already attributed to the WFD. It is expected that the compliance costs for the German agricultural sector exceed the 191.2 million EUR indicated by legislators. Further costs arise due to the application of liquid manure in a way which minimises emissions, on the one hand. This amounts to additional costs of 245.2 million EUR. On the other hand, a larger area is needed for the application of organic fertiliser incurring extra costs of about 33.6 million EUR. Finally, reduced nitrogen and phosphorus feeding strategies generate extra expenses. These incurred costs are about 22.5 million EUR for pig fattening and milk production. In total, the additional costs caused by the revised German Fertiliser Ordinance are 492.5 million EUR. The crop specific extra expenses vary between 22 EUR/ha for cereals and 63 EUR/ha for silage maize.

In the context of the WFD some costs caused by the EU Directive 2009/128/EC on the sustainable use of pesticides have already been discussed. These expenses are incurred by the agricultural sector due to, for example, the reduction of chemical plant protection to the necessary “minimal amount” and banning the application of certain substances near to water. However, the costs incurred by German agriculture through the implementation of EU Regulation 1107/2009 concerning the placing of plant protection products on the market are not considered in this context. This regulation has intended “cut-off” criteria for the approval of active ingredients. This means that the continued application of specific active ingredients can be denied. The costs of such a denial have been calculated for two examples: a ban on neonicotinoids and a (potential) ban on active ingredients, which are considered endocrine disruptors. For main arable crops (namely wheat, barley, corn, oilseed rape, potato, and sugar beet), a ban on the two aforementioned examples would lead to costs of 1.118 billion EUR. Crop specific incurred costs have a large spectrum ranging from 105 EUR/ha for wheat to 568 EUR/ha for potatoes.

In animal husbandry, additional costs are expected beyond the expenses incurred by the EU Nitrate Directive (see above), due to the fulfilment of various other environmental standards and regulations. More than 15 EU directives and regulations regarding animal welfare, animal health and food safety, must be taken into account. Thus, the additional protection of animal welfare surrounding milk production costs about 1.95 EUR/t milk. In pig fattening, animal welfare costs 33.20 EUR/t carcass weight. Additional expenses of 2.93 EUR/t milk are caused by the

consideration of food safety and animal health issues. The same factors are responsible for incurred costs of 32.10 EUR/t carcass weight in beef production. In pig fattening, food safety and animal health standards cause extra costs of approximately 29.20 EUR/t carcass weight, and the costs of food safety, animal health and animal welfare regulations are 47.15 EUR/t carcass weight for poultry farming. The aggregated effect is significant: The aforementioned aspects cost 696.0 million EUR.

The already analysed environmental standards and regulations include some costs caused by bureaucracy and many expenses as regards the provisions of cross compliance. However, two additional aspects pertaining to the costs incurred by bureaucracy and cross compliance must be mentioned. First, the costs incurred by the application for EU direct payments must be noted. These are approximately 14.94 EUR/ha in Germany. Hence, the applications for EU direct payments cause total costs of 250.1 million EUR. Second, the costs of adherence to minimum food safety standards for cereal production of 7.7 million EUR need to be taken into account. These two aspects, which were not included in the previously conducted calculations, add up to 257.8 million EUR extra costs for bureaucracy and cross-compliance.

The implementation of greening measures on the basis of the EU's CAP is a relatively new policy requirement. Greening aims to increase the environmental performance and protect the climate by diversifying crops, maintaining permanent grassland and the implementation of "Ecological Focus Areas" (EFA). EFA cost in total 835.6 million EUR in German arable farming, and the average gross margin loss is 49.87 EUR/ha. As a response to the long-term trend of converting grassland into arable land, greening also aims to protect environmentally sensitive areas especially by maintaining permanent grassland. This leads to additional greening costs for farmers, since the gross margin is higher for crop production on arable land than it is for convertible grassland. After three years, sectoral costs due to this particular measure have been calculated at 31.2 million EUR. This means that the accumulated costs incurred through greening are at least 866.8 million EUR.

Currently, a revision of the Technical Instructions on Air Quality Control is being discussed in Germany. For swine production, the incurred costs can be approximated. In pig fattening, costs have been calculated at 237.9 million EUR, and for pig breeding at 68.4 million EUR. In total, the costs amount to 306.3 million EUR.

The depicted facts for lost revenue and/or extra production costs in the German agricultural sector caused by environmental standards and additional regulations can be summarized in the following figure A.

Figure A: Costs incurred by environmental standards and additional regulations in the German agricultural sector (in million EUR)

Thematic focus	Specific costs
Costs incurred by the Water Framework Directive	1,539
Costs incurred by the new Fertiliser Ordinance	493
Costs incurred by additional plant protection regulation	1,118
Costs incurred by specific standards of animal husbandry	696
Additional costs incurred by bureaucracy/cross compliance	258
Costs incurred by greening	867
Costs incurred by the Instructions on Air Quality Control	306
Total costs considered in this analysis	5,277

Source: Own calculations and figure.

Clearly, the sum of the considered costs for the agricultural sector exceed 5.2 billion EUR. Transferred to the total hectares of agricultural land in Germany, the costs incurred are about 315 EUR. This number is too large to be marginal or economically negligible and constitutes a large burden for the German agricultural sector.

This impact is also apparent on the single farm level. The annual financial burden caused by the aforementioned EU standards and additional regulations is almost 28,000 EUR for an average commercial family farm in Germany. This is about 367 EUR/ha agricultural land. An average larger farm in Germany, which is run as a corporate entity, incurs annual costs of over 400,000 EUR due to environmental standards and additional regulation, which corresponds to about 356 EUR/ha agricultural land. An average cattle farm faces a financial burden of “merely” 278 EUR/ha agricultural land.

These are the results of a comprehensive literature analysis and own calculations reflecting the state of knowledge about costs resulting from environmental standards and additional regulations for the German agricultural sector. However, the analysis is limited and must be further developed. This is due to the fact that there is no reliable data or information regarding the cost effects of certain standards or regulations. Thus, some quantifications in the context of this study are still not possible. With reference to the new Fertiliser Ordinance, for example, it is expected that farmers will fertilise more at the “margin” than as a means for maximum yield. This may lead to foregone revenue. Also, a number of active ingredients in plant protection products are topics of public discussions. In the context of the EU Regulation 1107/2009 concerning the placing of plant protection products on the

market, more potential bans on active ingredients are expected. It is possible that these bans alone could cause another billion EUR in sectoral costs. Further animal welfare measures are also expected in the future, which could also cost billions of EUR. Costs incurred due to crop diversification and banning plant protection products on EFA as a part of greening must also be mentioned here. All these developments point to the fact that the costs of German agriculture due to environmental standards and additional regulations are higher than the total monetary effects determined above.

The about 5.3 billion EUR are on the lower scale of the actual financial strain, which is understood as the monetary effect of foregone revenue and additional production costs. This is additionally made clear when taking into account agricultural services which are not rewarded adequately in this study, such as the preservation of the cultural landscape (the willingness to pay for this in Germany is in the range of several billion EUR), and costs incurred by different social standards.

What does the corresponding financial burden look like for competitors outside the EU? This is the second central question to be answered in this analysis. It must be noted that it is hard to give a complete answer. The available data and information makes this task particularly challenging. However, arguments can be found on the basis of case studies. When comprehensively analysed, the case studies indicate that the costs due to standards and regulations in German agriculture are (currently much) higher than those in non-EU competitor countries.

For example, the costs incurred by standards and regulations in Australian cattle farming are between about 16 and almost 35 percent of the costs incurred by cattle farms in Germany. Another extensive international study comparatively analysed the costs incurred from animal welfare, food safety and animal health standards, environmentally safe nitrogen management and plant protection regulations in selected non-EU competitor countries. On average, these countries only incurred 34 percent of comparable costs in Germany. For poultry farming, the costs incurred by standards and regulations are also (sometimes far) lower in all important competitor countries of Germany. On average, these costs are only 64 percent of German average costs. Reflecting the various case studies, it is finally important to recall that American water laws are far less restrictive than the EU's. Hence, they are not a particularly strong cost driver in the USA.

When comparing costs caused by standards and regulations in Germany to other non-EU competitor countries, it is also important to keep in mind that many cost-effective standards and regulations have no relevance for the competitors. Namely these are the changes in the new Fertiliser Ordinance, the EU Regulation 1107/2009 concerning the placing of plant protection products on the market, greening, and the potential changes to the Technical Instructions on Air Quality

Control. Also, the costs of the application for EU direct payments are not relevant in non-EU countries. In sum, costs of 3,034 million EUR are irrelevant in Germany’s non-EU competitor countries. The aforementioned standards and regulations, which lead to almost 57 percent of Germany’s costs, simply do not exist in these competitor countries.

It becomes apparent: For a direct comparison between the costs caused by standards and regulations in non-EU competitor countries, only some cost aspects are relevant in the context of this study. These are the costs of the WFD, the costs incurred by specific standards and regulations in animal husbandry and the costs caused by ensuring food safety for plant products. These amount to 2,242 million EUR. Based on the case studies’ findings, it can be assumed that German farmers would not have to bear these financial sums, if the aforementioned standards and regulations were the same in Germany as those in non-EU competitor countries.

Figure B presents (a) the product-specific costs carried by farmers in Germany due to the aforementioned standards and regulations. It also shows (b) how high their product-specific financial burden would be if they merely had the average costs of a non-EU competitor country as regards these standards and regulations.

Figure B: Cost comparison for German farmers with standards and regulations as in Germany vs. in non-EU competitor countries (in EUR/ha or EUR/livestock unit)

	Reference situation	Scenario
	(current standards/regulations in the EU / Germany)	(analogous standards/regulations of a non-EU competitor country)
Wheat	256.22	49.69
Barley	255.92	49.69
Other cereals	306.79	70.52
Oilseed rape	327.63	56.44
Potato	763.51	58.64
Sugar beet	535.19	31.10
Silage maize	221.56	139.42
Other arable crops	222.98	106.19
Meadows and pastures	124.28	41.44
Cattle (w/o dairy cows)	26.51	14.86
Dairy cows	57.08	21.84
Swine	154.15	33.41
Poultry	49.66	34.93

Source: Own calculations and figure.

Generally, a large cost reduction may be expected for German farmers, if the German standards and regulations were identical to those in non-EU competitor countries. This is a clear argument that German farmers have a significant financial burden imposed on them, due to societally motivated very high environmental standards and additional regulations. This additional financial burden is above 3.0 billion EUR and constitutes 181 EUR extra costs per hectare agricultural land. Following the scenario from figure B, the financial burden would be lower by ca. 246 EUR/ha agricultural land. Currently, the incurred costs are 315 EUR/ha, the costs in the scenario are by comparison only 69 EUR/ha agricultural land.

This explains lower incomes and a large competitive disadvantage for farmers in Germany. It furthermore influences private sector decisions and has political implications. Consequently, the large financial burden through environmental standards and additional regulations – especially when compared to non-EU competitors – must be taken into account in discussions regarding the further development of the EU's CAP. To potentially negate this would mean to forego competitiveness within our diverse agrarian structures. It is also important to note that the standards and regulations influence farmers in making investments at large scale. This is increasingly essential because the pertinent regulations in the EU and Germany are likely to become even tighter.

Apart from these policy and investment aspects, research challenges are also brought to light. A more precise measurement of the actual costs due to the already discussed standards and regulations, as well as the costs of those not discussed, is needed on the one hand. On the other hand, future analysis must focus more substantially on the analogous costs in competitor countries. Only with this information will it be possible to analyse the competitive disadvantage of German farmers in more detail. Both of these needed analyses require a larger data and information basis. This is why continuous monitoring of scientific and technical literature is advised. However, decision-makers must also be involved in the growth of the information basis through, for example, collecting and aggregating data for relevant costs on single farm level. On this basis, more suitable policy (and private) decisions can be made.

Having in mind such decision-making, the findings of this paper make an important contribution to the very crucial objectivity of the debate surrounding the future of the CAP in the EU. Especially the knowledge gap regarding the costs pertaining to environmental standards and additional regulations is reduced. The results in this study offer information for a more informed decision-making and clarify the accusation that farmers cause environmental and societal costs, without contributing themselves to a better environment. In reality, the agricultural sector contributes to numerous public interests. Standards and regulations are seen as an expression of societal preferences, which farmers recognize and help to carry.

Conclusions (chapter 6 of the study)

This study's objective was to analyse additional costs incurred by farmers in Germany due to compliance with environmental standards and other current regulations. This was done on the basis of a comprehensive literature analysis and own calculations. The costs which farmers in Germany must bear due to the relevant regulations were then additionally compared to the potential costs incurred, if the standards in the EU were the same as in non-EU competitor countries.

Essentially, the costs of compliance with standards and regulations in Germany are a large economic factor and increase the production costs for agricultural primary products. In opposite to that, the incurred production costs in non-EU competitor countries are significantly lower. This indicates significantly higher costs and a competitive disadvantage for farmers in Germany.

This has economic, but also political implications. Currently, agricultural policy support in Germany, and especially within the framework of the EU's CAP, is under debate. The policy support measures aim at compensating farm income losses caused by comparably high standards in Germany and the EU. Further, they intend to compensate unfavourable natural conditions and societally desired services, which the agricultural sector provides. This agricultural support is currently being questioned. Considering this, the basic notion can be established that according to the determined costs (in the analysis) and other unpaid services provided by the agricultural sector, the policy support is not excessive – particularly because these costs are not sufficiently internalized by market prices.

Especially in comparison to international non-EU competitors, the large financial burden through environmental standards and other regulations must be taken into account in discussions regarding the further development of the EU's CAP. To potentially negate this would mean to jeopardise competitiveness within our still diverse agricultural structures. It is also important to note that meeting the various standards and regulations requires farmers to make large scale and continuous investments. If compliance to pertinent regulations were to become increasingly difficult, or even impossible, this could lead to a variety of ramifications due to a poorly targeted agricultural policy framework. These include accelerated structural change and cutbacks regarding the multifunctionality of the agricultural sector. This especially applies since it can be assumed that the pertinent regulations in the EU and Germany are likely to become even tighter.

The analysed status quo and its perspectives are very clear, as are the attendant challenges. Although this study reduces knowledge gaps, some questions remain. Therefore, further research is needed. On the one hand, research should focus on a more precise monitoring and quantification of costs incurred by the considered

standards and regulations. Also, the costs incurred by other standards and regulations, which were excluded in this study, must be identified. On the other hand, future analysis must focus more substantially on the expenses caused by standards and regulations in competitor countries. This is the only way possible to more stringently measure the competitive disadvantage of farmers in Germany, instead of only estimating it.

Both of these analyses would require a larger data and information basis. This is why continuous monitoring of scientific and technical literature is advised. However, policy decision-makers must also be involved in the growth of the information basis. A potential survey regarding costs incurred by standards on single farm level, e.g. through the EU's farm accountancy data network, could accentuate and further develop the analysis in the future. Based on this, sound and, therefore, more suitable agricultural policy decisions can be made in the future.

Although not all questions could be answered, this study provides an important contribution for a more rational debate about the future of the CAP in the EU. Especially the knowledge gap regarding the costs of environmental standards and regulations is reduced. Thus, the study's results offer the point of departure for more informed decision-making. The results also allow for a more holistic view of the costs and benefits of agricultural activities.

The results may particularly clarify the "accusation" that farmers cause environmental and societal costs, without contributing themselves. In reality, the agricultural sector goes to great lengths in order to contribute to public interest, even beyond the standards and regulations in place. This is done in the interest of a greater common good. Standards and regulations are seen as an expression of societal preference. Farmers don't only accept these, but recognize and help to carry them.



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