

A CAP-Reform Model to strengthen Nature Conservation – Impacts for Farms and for the Public Budget in Germany

Ein GAP-Reform Modell zur Stärkung von Umwelt- und Naturschutz –
mögliche Auswirkungen auf Betriebe und öffentliche Haushalte in Deutschland

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Summary

The paper investigates the financial impact of a new proposed CAP reform model on farm incomes and on budgets. The model proposes a new instrument of specific and effective (dark-green) agri-environmental measures and a substantial cut in direct payments. The simulations are based on 20 typical farms. We demonstrate that farms which drop out of the CAP support have to face substantial income losses (23% for arable farms and 36% for livestock farms). In a “business as usual” scenario, farms lose some income (9%/13%). The incentives of the new model show, that farms can compensate the income losses by increasing their participation in agri-environmental schemes: If participation in the new set of agri-environmental tools is extended, farms can increase their income between 7-9%. We also demonstrate (based on some assumptions), that this reform can be done within a constant financial budget.

Keywords: Common Agricultural Policy (CAP); Agri-Environmental and Climate Programs

Zusammenfassung

Das vorliegende Papier untersucht die finanziellen Auswirkungen eines neu entwickelten GAP-Reform Modells auf die Einkommen landwirtschaftlicher Betriebe und den Agrarhaushalt. Das Modell schlägt ein neues Instrument für effektive (dunkelgrüne) Agrarumweltmaßnahmen sowie deutliche Kürzungen der Direktzahlungen vor. Die Berechnungen basieren auf 20 typische Betrieben. Betriebe, die aus der GAP-Förderung aussteigen, erleiden größere Einkommensverluste (23% bei Ackerbaubetrieben und 36% bei Tierhaltungsbetrieben). Auch im ‚Business as usual‘-Szenario müssen die Betriebe Einkommenseinbußen verkraften (-9%/-13%). Die Anreize des vorgeschlagenen Politikmodells führen zu einer höheren Teilnahme an Agrarumweltmaßnahmen: Betriebe mit einer höheren Teilnahme können ihr Einkommen etwas steigern (+7%/+9%).

Schlagworte: Gemeinsame Agrarpolitik, Agrarumwelt- und Klimaprogramme

1 Introduction

The Common Agricultural Policy (CAP) is financially still the largest European Policy with yearly 57.7 bn. EUR in 2017 and a share of 38% of the total EU-budget (EU Commission, 2017). The introduction of the ‘Greening’ as a condition for receiving direct payments was one claimed achievement of the last CAP-reform 2013, which however has failed to address the ongoing biodiversity decline (Pe’er et al., 2017). Agricultural biodiversity continues to decline, as for instance reported in a highly debated publication on insects decline in Germany (Hallman et al., 2017). The CAP is a crucial policy area to prevent the ongoing biodiversity loss in agro-ecosystems. This, however, necessitates an improved policy design and an efficient implementation.

The paper investigates the potential impacts of a new proposed CAP reform model, which is focused on the maintenance and enhancement of agro-biodiversity and which considers a number of substantial changes in the policy design of the CAP. The proposed model was developed together with the Naturschutzbund e.V. (NABU) and it proposes a number of substantial changes within the CAP:

- A reduction of the income support through direct payments and a change of the remaining pillar I payments into a ‘*Sustainability payment*’ linked to some general sustainability requirements for the whole farm.
- A new policy instrument (*Agri-Nature payment*), which is focused on effective biodiversity measures. This payment is developed from effective (‘dark-green’) biodiversity measures and is substantially higher than the actual payment level within agri-environmental payments. The model also proposes a funding tool for extension and farm management of agri-environmental measures (*Agri Management payment*)
- The existing framework for *Rural Development Programs (EAFRD)* is maintained, however with small changes within the system.
- The model contains a changed logic of co-funding of the EU, which links the level of EU-co-funding to effectiveness: More targeted and effective programs are granted a higher co-funding rate than general, less requiring and less targeted programs.

Based on a normative approach, we simulate the impacts of a CAP reform model on farm incomes of 20 typical farms in Germany. We also investigate the implications on the financial budget of Germany based on a number of restrictive assumptions.

2 Background: Delineating a reform-policy from actual CAP-deficits

Recent decades have seen a worsening of numerous environmental problems in European farmland. These include the conversion or use intensification of grassland, the run-off of excess nutrients into water bodies, the increasing use of pesticides, land use intensification to produce bioenergy crops, as well as the continuing loss of semi-natural habitats in agricultural landscapes. Farmland biodiversity continues to decline, and many bird species as well as other animals and plants are becoming increasingly rare. These problems are not confined to nature conservation, but affect all the natural resources, including soil and water, climate, flora and fauna and the cultural values of landscapes (for a comprehensive overview see Oppermann et al., 2012; BfN, 2017).

The Greening measures introduced in 2015 to improve the environmental performance of the Common Agricultural Policy (CAP) have done very little to reverse this trend (Pe’er et al., 2017). Within Greening, Farmers often select the easiest options for implementation and not those that have the greatest ecological benefit (Pe’er et al., 2017, Zinngrebe et al., 2017). The ecological focus area have introduced little value added for biodiversity compared to the pre-Greening period (Lakner et al., 2017) and Greening probably contains substantial windfall gains (Lakner und Holst, 2015).

The agri-environmental programs could serve to improve the biodiversity, however, empirically not all regional programs show desired effects on biodiversity (see e.g. Kleijn et al., 2006, Batary et al., 2015). Monetary incentives are one main driver of participation, which has been shown in different studies (Niens und Marggraf, 2010). Oppermann et al. (2015) argue, that higher payment would be necessary to implement and incentivize effective agri-environmental measures. Batary et al. (2015) find based on different studies, that dark-green (targeted) schemes tend to be more effective, than light green (untargeted) schemes and that special targeting can support declining species much better (Batary et al., 2015). Furthermore, the take up of agri-environmental schemes is hindered by high administration costs (Fährmann und Grajewski, 2013). The question is, whether the CAP after 2020 can be used as effective tool to address the environmental challenges. Given this background, we developed a CAP reform model together with Naturschutzbund e.V. (NABU), outlining how a new system of EU agricultural payments could be structured.

3 Policy Model Scenario(s)

The proposed model suggests a comprehensive restructuring of the support architecture with three main elements, which are all linked to the principle of public funding for public goods. Farmers can voluntarily choose and combine the following elements (for more details see Oppermann et al., 2016):

The *Sustainability Payment* is linked to a number of public goods such as maintenance of landscape, compliance to environmental rules, climate change and animal husbandry. This payment of 150 €/ha is paid for the total area of a farm. The co-funding rate of the EU is 70%.

The *Nature Management Payment (NMP)* is a new element, which is linked to an on-farm planning and extension service: The result will be a farm-management plan for environmental services, which the farmer develops with the support of a specific consultant. Consequently, this payment is also paid for the total farm area, however, only with a required minimum participation in AECM.

The *Agri-Nature Payments (ANP)*: Our model comprises ten effective measures to support and maintain biodiversity and ecosystem services, of which the member states or regions can select for their adjusted programming. We assume a grassland payment of 700 EUR/ha and a payment of 1.350 EUR/ha for measures on arable land. These measures are offered with high co-funding of the EU (90%) considering the high effectivity as well as administrative costs (Fährmann und Grajewski, 2013).

The *Agri-Environmental and Climate Measures (AECM)* are maintained, including the measures for organic farming. EU member states or regions can still choose from the ex-

isting measures, like extended crop-rotation, use of pheromones in wine-production or the use of techniques like dag hoses for the use slurry. These measures are offered with a lower con-funding rate (50-70%). *The Rural Development Programs* (RDP in Pillar II) apart from AECM remains unchanged.

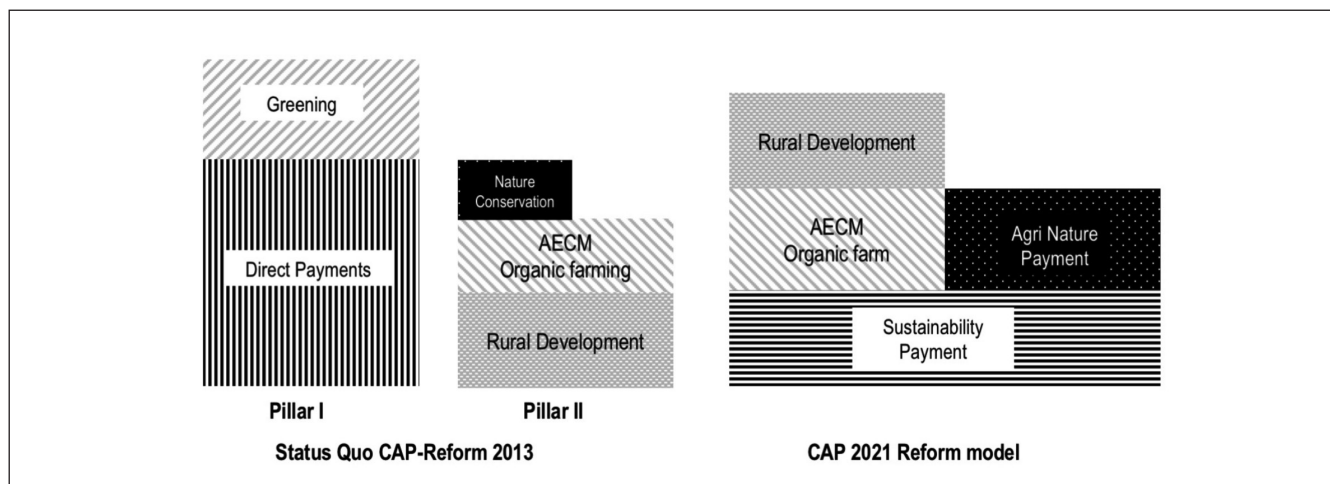
The new policy architecture of the model is displayed in figure 1.

4 Methods

We selected 20 regions within Germany and created ‘*typical farms*’ using structural information on the county level from the Farm Accounting Data Network (F.A.D.N.). We also did plausibility checks on the farm structures. The choice of farms is supposed to reflect the production diversity within Germany with all different agricultural production types and with all soil qualities from (see figure 2):

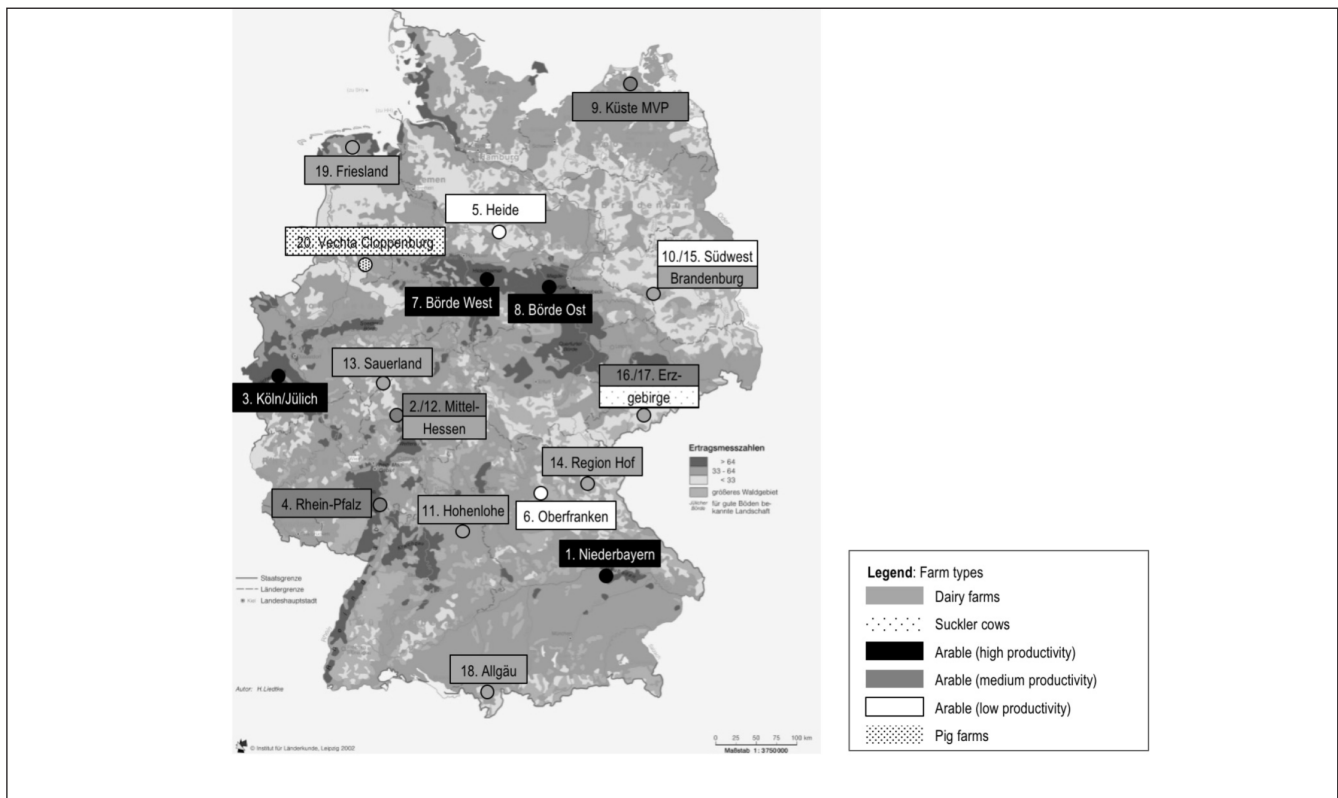
We calculated the farm income using the method of *standard gross margins* (see box 1). We calculated the income in a reference situation, using a multiannual (2008/09 -2014/15) average of regional standard values for gross margins, provided by a database of the KTBL (2016). We calculated the income prior the reform (reference model), we also include the specific payments within the CAP-reform 2014-2020 framework, including the first hectares and the Greening payment. We include the agri-environmental contracts within a farm, which are typical in the different regions. We also consider the typical regional overhead costs taken from the F.A.D.N.-dataset (for details see Oppermann et al., 2016).

Figure 1: Funding architecture of the new CAP reform model



Source: Own presentation

Figure 2: Regional model farms for the simulation of the CAP-scenarios



Source: Own presentation

Box 1: Method to calculate the farm income in the reference scenario 2017

Reference scenario 2017

Typical farm structure (based on F.A.D.N.-data)

- + Calculation of the Farm Standard Gross Margin 2008-2014 (based on KTBL)
- + Direct payments (161-186 €/ha)¹ + Greening-Payment (86 €/ha) + First Hectares²
- + Average payments from agri-environmental (based on F.A.D.N.-data)
- Average overhead costs (regional specific, based on F.A.D.N.-data)
- = **Farm income in the reference scenario 2017**

1: The direct payments in Germany are different across federal states and lie between 161-186 €/ha.

2: We also considered the payments for the first hectares: 50 €/ha for the first 30 ha and 30 €/ha for 30-46 ha (BMEL 2015).

Third, we implemented the CAP-reform model 2021 on the 'typical farms' and calculated the potential adjustment costs of the new CAP-model 2021 (box 2). Variant 1 assumes a complete exit of a farm from the CAP subsidization, variant 2 is a continuation of the previous participation in AECM. In variant 3 and 4, a typical farm implements measures in order to receive the new Agri-Nature Payments. For the implementation costs we considered a number of cost components (Köhne, 2011):

- a) The *direct process costs of the program-participation*, such as e.g. ploughing or seeding seeds for flowering strips,
- b) the *change of the support payments* from AECM to Agri-Nature Payments (ANP) and

c) the *opportunity costs* due to the loss of arable land, which is in many cases the loss of the standard gross margin of barley or rye within the crop-rotation.

d) The sustainability payment restricts the animal density to 1.6 Animal Units (AU)/hectare. For three farms with higher animal densities we include *the costs of reducing the animal density*.

We do not consider the devaluation of land due to the fact, that there is an AECM (Köhne, 2011).

Box 2: Method to calculate the farm income in the reference scenario 2017

Scenario CAP reform model

- + Calculation of the Standard Gross Margin (average 2008-2014)
- + Sustainability payment (150 €/ha) + Agri-Management Payment (50 €/ha)
- + Payment for different Agri-Nature Programs (600 €/ha grassland, 1.350 €/ha arable land)
- Adjustment costs for arable land and grassland with reduced yields
- Average overhead costs (region specific, based on F.A.D.N.-data)
- = **Farm income after the reform 2021**

Table 1: Farm types on arable land and their program-participation at AECM

Description of the variants and participation behaviour of farms	Program participation AECM ¹ and ANP ¹	
	CAP 2014-2020	After the reform
A) Arable land		
Variant 1: Complete exit from EU support: No direct payments or AECM ¹	1%	–
Variant 2: Business as usual A mostly as in the reference scenario		5%
Variant 3: Moderate expansion of complex ANP-measures		10%
Variant 4: Substantial expansion of complex ANP-measures		20%
b) Farms with animal production and grassland		
Variant 1: Complete exit from EU support No direct payments, no agri-environmental ¹ support	95% simple ² AECM 5% complex AECM	No participation
Variant 2: Business as usual mostly as in the reference scenario		95% AECM ² 5% ANP ³ -measures
Variant 3: Moderate expansion of complex ANP-measures		80% AECM ² 20% ANP ³ -measures
Variant 4: Substantial expansion of complex ANP-measures		50% AECM ² 50% ANP ³ -measures

Source: own presentation

1: AECM = Agri environmental and climate measure (only targeted AECM with biodiversity effects are considered.)

2: Many „simple” or light-green AECM on grassland are support-programs for the whole farm. (e.g. Animal density to be 0,3-1,6 AUM /ha, no mineral fertilizer); If additional Agri-nature payments are used, on these areas a higher premium is paid. This is why percentages add up to 100%.

3: ANP = Agri-Nature payments

We calculate with four variants of adjustment (table 1) for arable farms and for livestock farms:

5 Results and Discussion

5.1 Impact of the CAP-reform model on the farm income

Figure 3 shows the average income effects for the different farm types in *four variants*.

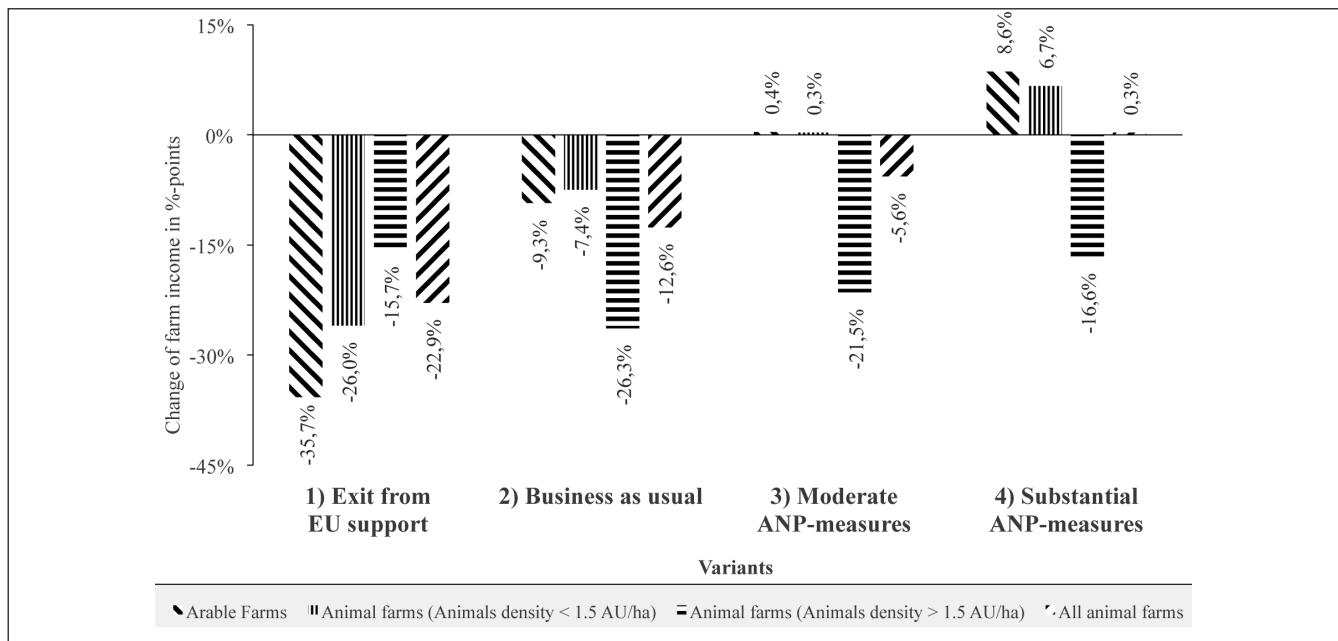
The simulation result show of *variant 1* (exit from EU support) lead to a significant loss of income. For the arable farms, the losses are on average at -35% and range between -20% and -57%. For livestock farms, the average loss is at -23%, however, there is less variation. The maximum loss is at -30%, and especially livestock farms with animal density < 1.6 AU/ha have losses between 13-20%.

In *variant 2* (business as usual), we can observe some losses as well: Arable farms loose on average -9% (from -5% to -15%). For livestock farms, the losses for farms with high animal density are significant (-26%), whereas the losses for farms with low animal density are at -7.4% (-5.1% to -9.5%). The losses of livestock farms with high animal densities are caused by a reduction of animal numbers in order to comply to the sustainability payment (< 1.6 AU/ha). As in other studies, the animal density is a limiting factor for AECP (e.g. Kantelhardt und Hoffmann, 2001).

In *variant 3*, an increasing share of Agri-Nature Payments (ANP) leads to a reduction of losses to 0.4% for arable farms (-2.9% /+ 4.9%) and 0.3% for farms with low animal density (-2.1% to +1.2%). Only farms with high animal density still have substantial losses of -21.5%.

Consequently, in *variant 4* with a substantial increase of the ANP, arable farms profit in average with +8.6% and livestock farms with low animal densities profit with +6.7%.

Figure 3: Change in Farm income due to the CAP-model 2021



Source: Own calculations

Livestock farms with animal densities >1.6 AU/ha have to face income losses of 16.0%.

5.2 Impact of the CAP-reform model on the budget

The calculation of the national budget is based on a number of assumptions:

- We assume that the participation in the *Sustainability Payment* is still high such that 75% of the agricultural land is subject to EU support within the new model. On 50% of this area (= 37.5%), farms participate in the *Nature Management Payment (NMP)*, which incentivizes environmental planning on the farm on a larger scale.
- The participation at the *Agri-Nature Payments (ANP)* increases compared to the reference scenario: 10% of arable land and 20% of grassland will be supported by the ANP.
- The *other main elements of pillar II* are maintained: The actual agri-environmental and climate measures (AECM) are maintained, however with a reduction of 20% in the budgets, since the complex Agri-Environmental Programs are now part of the Agri-Nature Payments (ANP). The support of organic farming will be slightly increased (+30%) for reason of consistency. The other Rural Development Programs (RDP) apart from AECM are continued as well.
- The *co-funding rates* of the EU are substantially changed: High co-funding rates of 90% are granted for the highly specific programs (like ANP), whereas for the more general payments (e.g. Sustainability Payments), the co-funding rates are 50-70%.

- For the Agri-Nature Payments (ANP) some administrative top-ups (+25%) are paid for the control and monitoring tasks.

Based on these assumptions, the budget remains constant despite the substantial changes of the policy. The following table 2 shows the details of the budget changes:

The actual budget of both pillars is 7.3 bn. EUR/year, of which 6.2 bn. EUR are financed by the EU and 1.1 bn. EUR is co-funded by the federal government and the Bundesländer of Germany. After implementing the reform-model, the Sustainability Payment takes about 25% of the spending and the Rural Development Program has 31%. The share of national co-funding (14.8%) remains unchanged.

The new *Agri-Nature Payments* take the largest proportion of 43%. However, with this substantial change in funding, the new policy model would be focused on effective biodiversity measures. The reform model includes a financial transfer for nature-conservation measures of 25% additional to the sum of Agri-Nature Payments, which incentivizes effective measures, and which also compensates for higher administrative costs of implementation. The *Rural Development Programs (RDP)* are maintained by the reform, however the financial budget is slightly decreased, since parts of the new Agri-Nature Payments substitute measures within the old RDP.

Table 2: Impacts of the CAP reform model on the budgets

CAP 2014-2020 (Status Quo)			Fit, fair and sustainable reform model		
Policy Area	Co-fund- ing	Payment (Mio. EUR)	Policy Area	Co-fund- ing	Payment (Mio. EUR)
Pillar I			1. Sustainability		
<i>Direct payments (basic payments)</i>	100%	3,007.5	<i>Sustainability Farm Payment</i>	70%	1,879,2
<i>Greening</i>		1,451.2	Sum Sustainability		1,879,2
<i>Young farmers</i>		49.0	2. Agri-Nature		
<i>Redistribution (first hectares)</i>		351.0	<i>Agri Nature Payments (ANP)</i>	90%	2,251.0
Sum Pillar I	4,858.6	<i>Nature Management Payment (NMP)</i>	313.2		
Pillar II (EAFRD)		<i>Nature Development Payment (NDP)</i>	562.7		
Agri-environmental & climate (AECM)			Sum Agri Nature		3,126.9
<i>of which agri-environmental programs</i>	39-78%	468.4	3. Rural Development Programs		
<i>of which organic farming</i>		231.0	<i>Agri-environmental & climate measures</i>	70%	374.7
Sum AECM		699.3	<i>Organic farming support</i>		323.4
Rural Development Programs (Rest EAFRD)		1,711.6	<i>Rural Development Programs</i>	50%	1,540.4
Sum of Pillar II		2,410.9	Sum Rural Development		2,238,5
Sum CAP 2014-2020 total		7,269.5	Sum CAP Reform Model		7,244.6
<i>of which EU funds</i>		6,193.2	<i>of which EU funds</i>		6,170.2
<i>of which national funds</i>		1,076.3	<i>of which national funds</i>		1,074.3

Source: Own calculation

6 Discussion and Conclusions

In the final section, we discuss a number of systematic problems of agri-environmental policies within the CAP, which could be improved by using alternative reform models such as the one presented here:

1) *The policy model can incentivize nature conservation:* Farms maintaining their business as usual (var. 2) have to face some income losses based on the change of Direct Payments into a Sustainability Payment. However, if farmers react with an increased participation in the new funding lines, they can overcompensate these losses. For livestock farms complying to animal densities (< 1.6 AU/ha), the policy model can incentivize the participation in effective agri-environmental programs. The voluntary nature of the measures might increase intrinsic motivation of participating farms. Therefore, a voluntary scheme seems more promising for the implementation of effective biodiversity policies.

2) *The WTO requirement is a challenge for the policy design of a reform:* The actual EU legislation does not allow for top-up payments beyond the pure opportunity costs. Based on this requirement, the EU can declare the agri-environmental payments as 'green-box payments' within the WTO-framework. A 'profit mark-up' cannot be granted within the actual rules of the EU Agricultural Fund for Rural

Development (EAFRD). The proposed CAP reform-model does not stick to this rule, which makes a participation in agri-environmental programs more attractive.

3) *Regional targeting still needs to be addressed:* The actual payments for agri-environmental measures leads to an insufficient participation in highly productive areas, whereas the participation in marginal regions is high. It might be appropriate to calculate agri-environmental payments according to the average regional soil productivity. This could improve the efficiency and targeting of agri-environmental programs, leading to better incentives in highly productive regions and reduce overcompensation in marginal regions. The proposed model would probably lead to better participation in highly productive regions, however, this comes at the costs of higher windfall gains. Therefore, a regional differentiation would be appropriate to solve this problem.

4) *A budget neutral policy reform is possible:* The change towards Agri-Nature payments within the given budget was based on a number of assumptions. Effective nature conservation programs require additional administrative costs for their implementation. The proposed model is therefore granting top-ups for Agri-Nature payments (+25%). Fährmann and Grajewski (2013) estimate the share of implementation costs for targeted nature-conservation contracts to 33%. This figure may be an upper limit for administrative

costs, because implementation of effective nature-conservation measures will be less costly, if the participation rates are higher. However, it deems important to give an incentive also for Member States to implement effective biodiversity measures.

5) *Changes in the animal husbandry will be an important factor for future policy design:* One challenge of policy design is to find an appropriate regulation, addressing the high nutrient uptake of the intensive animal production. The simulation results demonstrate that the limitation of 1.6 AU/ha leads to substantial income losses with a given reform. Any incentivized reduction of animal density will be costly. The regulation of an animal density of at maximum 1.6 AU/ha is quite ambitious, since e.g. the private organic standard of Bioland foresees an average animal density of 2.0 AU/ha (Bioland 2016). Some of the farms might react on investment programs to improve their stables according animal welfare criteria. Any substantial reform in the livestock sector will need a transition period.

6) *There are some remaining methodological challenges:* One shortcoming of this approach is the assumption on the program-participation. A simulation of 20 farms with typical regional farm structures cannot be representative and does not reflect the large diversity within the agriculture of Germany. The decision whether or not to participate in agri-environmental schemes is a matter of general preferences and risk perception of farmers. The simulation method does not sufficiently address the question, how many farms are willing to stay within the CAP support scheme, if substantial payment cuts are implemented. However, this is of specific importance for the budget implications. Addressing this question remains a methodological challenge for future research.

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