Consequences of a progressive reduction of direct payments in Germany: paving the way for post-2013?

Ebnet die progressive Kürzung der Direktzahlungen den Weg für eine Politik nach 2013? Eine Analyse für ausgewählte Regionen in Deutschland

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Abstract

Due to Germany's specific farm structure, the progressive modulation of direct payments decided within the Health Check of the Common Agricultural Policy (CAP) is of particular relevance for German agriculture. In this paper we apply the agent-based model AgriPoliS to shed some light on the structural effects of a progressive modulation as evoked in the Health Check (HC) proposal and the final agreement made in November 2008 for two German regions. Furthermore, we analyse whether a progressive modulation will allow for a continuous policy in the case of a reduced hypothetical single area payment of 150 €/ha starting in 2013. Results show that although we could observe substantial income effects in the short and long run, structural effects of the progressive modulation scheme are small but preservative. In contrast, the introduction of a reduced single area payment in 2013 would sharply increase structural change. In case the initial HC proposal is followed by a single area payment the previously observed policy effects would diminish for very large (above € 300,000 premium) and small farms (below € 100,000 premium). Still, although these effects are much less pronounced with the final HC agreement, the progressive modulation would provide farmers with wrong signals, as it is most likely that future reforms will be characterized by less support and thus require a stronger market orientation of farms.

Key words

Health Check; structural change; multi-agent system; policy analysis; simulation

Zusammenfassung

Auf Grund der spezifischen Betriebstrukturen in Deutschland ist die von den EU Agrarministern beschlossene „Gesundheitsbewertung" der gegenwärtigen Gemeinsamen Agrarpolitik der EU (GAP) und insbesondere die darin enthaltenen Vorschläge einer „progressiven Modulation" von besonderer Bedeutung für die hiesige Landwirtschaft. Aus diesem Grund wird das agentenbasierte Modell AgriPoliS verwendet, um für zwei Regionen in Deutschland die Auswirkungen einer progressiven Modulation, wie sie der endgültigen Beschlussfassung sowie in den ursprünglichen Vorschlägen enthalten ist, zu analysieren. Es wird weiterhin der Frage nachgegangen, ob im Falle einer deutlich reduzierten einheitlichen Flächenprämie in Höhe von 150 €/ha ab dem Jahr 2013 die progressive Modulation eine kontinuierliche Politikentwicklung ermöglichen würde. Die Ergebnisse zeigen, dass obwohl ein deutlicher Einkommenseffekt von der progressiven Modulation ausgeht, die Struktureffekte kurz- und mittelfristig gering sind, unter den ursprünglichen Vorschlägen aber dennoch strukturkonservierend wären. Im Gegensatz dazu würde die Einführung einer reduzierten einheitlichen Flächenprämie zu einem deutlich verstärkten Strukturwandel führen. Weiterhin kann gezeigt werden, dass für sehr große (über 300 000 € Prämie) und kleine Betriebe (kleiner 100 000 € Prämie) Auswirkungen einer reduzierten Flächenprämie unabhängig von der vorangegangen Politik wären. Obwohl mit den nun beschlossenen Regelungen die Struktureffekte wesentlich geringer ausfallen als unter den ursprünglich geplanten Vorschlägen, ist eine progressive Modulation der Direktzahlungen perspektivisch nicht eingängig, insbesondere vor dem Hintergrund der mit der Fischler-Reform verbundenen Zielsetzung, die europäische Landwirtschaft in Richtung einer stärkeren Wettbewerbs- und Marktorientierung zu führen.

Schlüsselwörter

Health Check; Strukturwandel; Multiagentensysteme; Politikanalyse; Simulation

1. Introduction

In November 2008 the EU Council of Ministers for Agriculture and Fishery finally reached an agreement on the Health Check of the Common Agricultural Policy (CAP) and thereby defined the CAP for the next years (EU COMMISSION, 2008a). The final agreement was a result of an extensive discussion on several preceding proposals. In November 2007, the Commission Communication "Preparing the Health Check of the CAP reform" (EU COMMISSION, 2007a) aimed at assessing the implementation of the 2003 Common Agricultural Policy (CAP) reform, in particular the introduction of the Single Payment Scheme (SPS). Among the list of adjustments to the reform process that "are deemed necessary in order to further simplify the policy, to allow it to grasp new market opportunities and to prepare it for facing new challenges such as climate change, water management and bio-energy" (EU COMMISSION, 2008a), the so-called progressive modulation opened a Pandora's Box in Germany. For several months, farm representatives, politicians and other stakeholders had intensive discussions on the Commission's proposal of introducing significant cuts in direct payments especially for large and very large farms. Actually, since 2005, a compulsory modulation of direct payments (Pillar I) has been applied for those payments exceeding € 5,000 per farm, with the money being reassigned to the Rural Development (RD) policy (also called Pillar II). Stating that Member States have "budget needs beyond their financial possibilities" for RD, in May 2008 the EU Commission proposed an increasing compulsory modulation by 2% annually from 2009 until it reaches 13% in 2012, as well as introducing a progressive element depending on the level of farm direct payments, and thus on farm size (EU COMMISSION, 2008a). Although since November 2007, the Commission had softened its initial proposal[1], the German position was clearly against any further increase in the modulation of direct

[1] This proposal suggested that the reduction of payments above € 100,000 be 10%, above € 200,000 be 25% and above € 300,000 be 45%.

Table 1. Distribution of direct payments by size class in Germany and EU-25

Size class of payments (€)	% of total amount		% of total beneficiaries	
	DE	EU-25	DE	EU-25
< 5,000	6.52	15.55	50.96	82.12
5,000 - 100,000	65.05	71.09	47.7	17.57
100,000 - 200,000	6.84	6.85	0.66	0.23
200,000 - 300,000	4.55	2.13	0.25	0.04
> 300,000	17.03	4.38	0.42	0.03

Source: own calculations based on EUROPEAN COMMISSION (2007b)

payments above the 5% initially planned until 2013.[2] The reason was that German farms would have been more affected than farms in the other EU Member States. This becomes obvious by looking at the distribution of direct payments by class size in Germany compared to the EU-25, as displayed in table 1.

Accordingly, there were many motives for Germany to avoid any further cut in direct payments, and these arguments are of particular relevance for Eastern Germany, where, due to the specific farm structure a significant number of very large farms could lose almost one-fifth of their payments in 2013. One fear was that the drastic cuts could threaten these farms and result in significant job losses in some already economically underdeveloped regions. Moreover, at the German national level, the net-payer position of Germany seemed incompatible with any cut in direct payments (SEEHOFER, 2008). Sharing these opinions or at least some of them, other EU Member States[3] joined the German position and seek to avoid any increase in the modulation (AGRA-EUROPE, 2008). With the final agreement a considerably weakened form of progressive modulation is now introduced. Accordingly, the modulation increases stepwise until it reaches 10% in 2012 for payments above 5,000 €. For payments above 300,000 € an additional rate of 4% is applied starting in 2009.

Although the modulated money is not necessarily lost for the farms, as they are shifted to CAP's second pillar, the question arises whether the agreement is a threat especially for large-scale farms in Eastern Germany and if the agreement is a kind of precedence for a systematic discrimination of large-scale farms. Therefore, the purpose of this contribution is twofold: in the first part we provide insights regarding the potential consequences of a progressive modulation as it is implemented in contrast to the original proposal of May 2008. As the planning period of the current proposal is limited to 2013, in the second part we discuss the long-term consequences of a progressive modulation and whether it allows for a continuous policy after 2013. Especially the second question seems particularly relevant, since due to the claimed shift towards uniform payments, the justification of the payments as compensation for prior reforms is no longer valid. Most likely, the current policy indicates only a first step towards further cuts in direct payments. To address this issue, we analyse the consequences of a potential follow-up policy characterised by a uniform payment at a drastically reduced level of 150 €/ha.

The methodological framework for our analysis is based on the agent-based model AgriPoliS (HAPPE, 2004; KELLERMANN et al., 2008). For this particular study the model is calibrated to two German regions as representing the heterogeneous farm structure in Germany. The first region, Hohenlohe, is located in the Federal State of Baden-Württemberg, and is dominated by small, intensive livestock and mixed farms. The second area is a sub-region of Saxony, in the eastern part of Germany, which is characterised by intensive arable farming under preferable natural conditions. In the context of the analysis of a progressive modulation policy, AgriPoliS offers some particular advantages. In brief, the "bottom-up" perspective of agent-based approaches allows analyzing the system at the same time on an aggregate level and on the farm level by explicitly considering the interplay of the individual responses of the farms. I.e., AgriPoliS captures the individual adjustment reactions of farms, given their specific (competitive) situation for, e.g., a progressive modulation or decoupling policy. This is an advantage compared to aggregate partial or general equilibrium approaches for which an implementation of farm specific responses on policy measures is only possible at the expense of the detailedness of the representation. At the same time structural change is kept endogenously in the sense that supply and demand elasticities (for production factors) are the result of the individual adjustment reactions and are not given exogenously. Inherent to this approach is furthermore to show results on a disaggregate level, and hence it is possible to show also the distributional effects of a policy in more detail, which is of particular interest in the given context.

The remainder of this contribution is organised as follows: In section 2 we provide a brief introduction to the model and the data used. This is followed by a description of the implemented policy scenarios in section 3. In section 4 we present the simulation results and discussion.

2. Material and method

The methodological basis of this contribution is the agent-based model AgriPoliS, which is a normative spatial and dynamic model for simulating structural change in agriculture developed by HAPPE (2004) and HAPPE et al. (2006). The most current version of the model documentation can be found in KELLERMANN et al. (2008). The main purpose of the model is to determine how farm structures change, particularly in response to policy settings. AgriPoliS represents an agricultural region as a system of interacting heterogeneous farm agents. Structural change in AgriPoliS is not exogenously given, but results from within the model. For this purpose, AgriPoliS maps the key components of regional agricultural structures: heterogeneous farm enterprises and households, space, markets for products and production factors. These are all embedded in a technical and political environment in which farms act and interact.

[2] c.f. „Stellungnahme der Agrarressorts der Länder zu den legislativen Vorschlägen der Kommission zum „GAP-Gesundheitscheck" [KOM (2008) 306/4] vom 20. Mai 2008", http://www.agrarministerkonferenz.de/uploads/Ergebnisprotokoll_Sonder_AMK_11_06_08_e5c.pdf

[3] Great Britain, Sweden, Czech Republic, Hungary, Romania and Slovakia

Figure 1. Exemplary MIP for decoupling and modulation (final agreement)

	Production activity I	Production activity II	Coupled paym.	Decoupled paym.	Modulated paym.	Modulation group I	Modulation group II	Modulation group III	
Objective function	GM	GM	0	0	1	0	0	0	<= *RHS*
Coupled payments	-330	-450	1						
Decoupled payments				1					Sum of prem. entitlements
Distribute payments			-1	-1		1	1	1	0
Modulation					1	-1	-0.9	-0.86	0
Max payments group 1						1			5000
Max payments group 2							1		295,000
Max payments group 3								1	+ inf.

Source: own

For the base period, the model is calibrated to the empirical data of the study regions. Later on, the farm structure velops according to the endogenous growth and shrinkage, including exits, of the farms.

The main entities in AgriPoliS are the farm agents and the landscape in which the farms are embedded. The internal state of a farm is organised as a balance sheet that keeps track of factor endowments (land, labour, assets, liquid capital, debts and quota), farmer's age, and expectations about future prices, along with a number of financial indicators. The landscape consists of plots of equal size but varying qualities (arable land, grassland, non-agricultural land), with some of the plots serving as farmsteads for the spatially-distributed farms.

Farms act autonomously in order to maximise their household income (family farms) or profit (legal entities). The farms' actions are derived from a mathematical programming approach. Within the mixed integer program (MIP) farm agents can engage in production activities, labour allocation, production quotas, and manure disposal rights and investment activities. To finance farm activities, farm agents can take on long-term and/or short-term credit. Liquid assets not used on the farm receive interest from the bank. Every production year a farm decides whether to stay in business. Interactions between farms are defined via markets for factor inputs and products.

Key drivers for structural adjustment reactions in AgriPoliS are those which influence strategic decisions regarding farm growth or shrinkage. In the model these are mainly the farms' land market decisions, the exit decision of farms and decision for investments into new assets. For the analysis of decoupled direct payments with a progressive modulation it seems therefore auxiliary to review the mode of action of these policies on the individual decision making of a farm. As mentioned above, the core of every farm's decision making consists of a mixed integer programming model. Figure 1 gives an excerpt from the MIP which shows how the modulation of payments is modelled at the farm level. Decoupling is introduced in a way that for the year of the introduction of the policy the premium volume of a farm is equally distributed over the eligible area of a farm. These farm specific premium entitlements are then bound to the land plots.[4]

The MIP is used to determine the optimal production and investment programme of a farm and forms the basis for series of other behavioural strategies:

1. Simultaneously to the farms' production programme, the investment strategy is optimized in the MIP. For investments, economies of size are considered. Furthermore, we assume investment costs to be sunk.
2. The land market, which plays a central role in AgriPoliS, is modelled as a first-price auction, where farms directly compete for available land plots. The bid of a farm for a plot is equal to the shadow price for land minus transportation costs. As we use a mixed integer approach, it is not possible to derive the shadow price directly from the dual solution of the optimisation. Thus, we calculate the shadow price by subtracting the current maximum household income of a farm from the maximum household income of the farm with one or a certain number of additional plots divided by the number of additional plots. To consider other costs like taxes, administrative costs, labour costs or fees associated with leasing land and the fact that a farmer wants to keep a part of the rent as a security mark-up, the bid is reduced by the factor β.
3. A farm exits the sector either if it is illiquid or if the opportunity costs of farm-owned production factors are higher than the expected agricultural income calculated with the MIP for each farm based on expected prices.
4. We assume that product prices are not influenced by the modulation.
5. Labour costs are annually increasing by 0.5%.

[4] In the model we do not consider a separate market for premium entitlements. Instead the premium entitlements are transferred with the land plots.

For the analysis we do not consider the possibility to divide farms in order to circumvent a progressive modulation. On the one hand it is not clear if there will be regulations, like a reference date for the assessment of the farm individual modulation rates which would prevent the possibility to circumvent the policy. On the other hand the overall effect of adjustment strategies would depend on the transaction costs associated with the division of a farm and could in principle be derived from the results of this study (assuming that one knows the transaction costs of a division and assuming that a division would take place pro forma). In case it is possible to divide up a farm, a farm would only accept an additional modulation to the amount of the transaction costs of that division. That is, in case of zero transaction costs the modulation policy would have no effects at all. Taking the final agreement as an example, the amount which could be saved through a division would result from the product of the maximum size of the new farm without any additional modulation (corresponding to the first € 300,000 minus € 5,000 - not subject to modulation) and the additional modulation rate for farms receiving more than € 300,000 (4%). The potential gain would thus amount up to approximately € 12,000.

Table 2. Type of farming (Total number, land use and percentage shares) in Hohenlohe

Type of farming	Total number	in %	UAA (ha)	in %	Average size (ha)
Field crop farms	459	16.0	9,569	13.0	20.8
Grazing livestock (incl. dairy)	906	31.6	21,683	29.5	23.9
Pig and poultry	988	34.4	27,766	37.8	28.1
Mixed	516	18.0	14,421	19.7	27.9
Total	*2,869*	*100,0*	*73,439*	*100,0*	*25.6*

Source: SAHRBACHER et al. (2007)

Table 3. Type of farming (number of farms, land use and percentage shares) in Saxony

Type of farming	Number of farms	in %	UAA (ha)	in %	Average size (ha)
Field crop	1,626	56.9	334,103	67.3	205
Grazing livestock (incl. dairy)	920	32.2	122,930	24.8	134
Granivore	37	1.3	2,223	0.4	60
Mixed	66	2.3	24,735	5.0	375
Others	209	7.3	12,458	2.5	60
Total	*2,858*	*100,0*	*496,449*	*100.0*	*174*

Source: SAHRBACHER et al. (2007)

Description of the two case study regions

Due to historical and geographical reasons, German agriculture is quite heterogeneous across the regions in terms of farm specialisation, size, etc. To consider this heterogeneity, the following two regions have been selected for this study:

- Hohenlohe (sub-region of Baden-Württemberg), a region of mixed production and intensive livestock, small-scaled;
- Central Saxonian Loess Region (sub-region of Saxony), an intensive field crop, large-scale farming region.

Both regions will serve as exemplary regions in this study for the various impacts of modulation policies in the simulation experiments described below.

The study region Hohenlohe is situated in the Federal State of Baden-Württemberg in the southwest of Germany. The region is characterised by a diversified agriculture with intensive livestock production (fattening pigs, sows for breeding and turkeys) on the plains, and dairy and forage production mainly in the valleys.

Table 2 illustrates the main structural features of the region.

The Central Saxonian Loess region is a sub-region in the Federal State of Saxony and is located in the southern part of Eastern Germany. The study region is part of a relatively large wheat belt with very fertile soils. The favoured natural conditions in the region's main area are also reflected in the high shares of cereals, especially winter wheat, found in the crop rotation (often more than 60%).

Comparing average farm sizes of both regions in tables 2 and 3 illustrates the substantial differences between the regions. Very few large farms exist in Hohenlohe in the base period, while this is the dominant characteristic of farms in Saxony. Of similar difference is the farm type distribution. In Saxony, a mixture of field crop and grazing livestock farms dominates the landscape, whereas the picture is more heterogeneous in Hohenlohe. As base year, the model is calibrated for both regions to 2001. This allows to capture the adjustment process of the last CAP reform.

3. Policy scenarios

The first scenario (REFERENCE) is the actual implementation of the hybrid dynamic decoupling policy in Germany. This policy implies a relatively complex system of payment entitlements which differ significantly across the country. The hybrid dynamic decoupling policy is introduced in 2005 and consists of splitting direct payments between a differential payment per hectare of arable land and grassland on the one hand (table 4) and a farm-specific payment on the other hand. The former payments for field crops are completely redistributed on arable land, whereas protein plants receive a top-up of 56 €/ha. Livestock payments are partially redistributed on grassland and on the farms receiving them before. This farm-specific payment decreases progressively between 2010 and 2013 and is replaced by a uniform area payment for arable land and grassland, though it is higher in the case of protein plant production.

A modulation of 3% in 2005, 4% in 2006, and 5% in 2007 and onwards is applied for farms with a total payment above € 5,000. Cross-compliance is also introduced in the model: any hectare of agricultural land rented or owned by the farm has to be kept at least in Good Agricultural and Environmental Conditions (GAEC).

Table 4. Direct payments as applied in Hohenlohe and Saxony in the framework of the German decoupling policy

		2001-04	2005-09	2010	2011	2012	2013-20
Cereals (€/ha)	Hohenlohe	324	323	325	328	333	340
	Saxony	392	384	385	387	389	393
Protein plants (€/ha)	Hohenlohe	384	379	380	384	389	396
	Saxony	452	440	440	442	445	449
Grassland (€/ha)	Hohenlohe	0	46	75	134	222	340
	Saxony	0[1)]	44	79	149	253	393
Dairy cows (€/head)	Hohenlohe	0[2)]	0				
	Saxony	0[3)]					
Beef cattle (€/head)	Hohenlohe	212	0				
	Saxony	206					
Suckler cows (€/head)	Hohenlohe	360	0				
	Saxony	313					

[1)]: 51 €/per hectare extensive grassland

[2)]: 103 €/head in 2004 according to an average milk yield of 5,700 kg/head and a milk payment of 1.81 Cent/kg

[3)]: 131 €/head in 2004 according to an average milk yield of 7,260 kg/head and a milk payment of 1.81 Cent/kg

Source: SAHRBACHER et al. (2007)

Table 5. Modulation percentages to be applied to farm payments in the HC scenario

Scenario	Size class of payment (€)	2007-2008	2009	2010	2011	2012-2020
Implementation	< 5,000	0%	0%	0%	0%	0%
	5,000-100,000	5%	7%	8%	9%	10%
	100,000-200,000					
	200,000-300,000					
	> 300,000	5%	11%	12%	13%	14%
Proposal	< 5,000	0%	0%	0%	0%	0%
	5,000-100,000	5%	7%	9%	11%	13%
	100,000-200,000	5%	10%	12%	14%	16%
	200,000-300,000	5%	13%	15%	17%	19%
	> 300,000	5%	16%	18%	20%	22%

Source: EU COMMISSION (2008a, 2008b)

In the second and third scenario (HC IMP, HC PROP) in addition to the policy settings of the reference scenario a progressive modulation is introduced as implemented in the final agreement (HC IMP) and the initial Health Check proposal (HC PROP). Table 5 summarises the rates applied in each modulation group for both case study regions. In both scenarios, after 2012 modulation rates implemented in 2012 are kept until the end of the simulation in 2020. As the allocation of resources of the second pillar of the CAP was not known at the time we made the study, we focus exclusively on the "input" side of the progressive modulation consisting in size dependent cuts of direct payment, i.e. we assume that released payments are lost for the sector.

Based on REFERENCE, HC IMP and HC PROP, we introduce three further scenarios from 2013 and onwards. In these scenarios we implement direct payments as an annual flat rate of € 150 per hectare of agricultural land. Before 2013, these scenarios HC IMP SAP 2013 respectively HC PROP SAP 2013 are identical to the HC IMP respectively the HC PROP scenarios, but afterwards followed by the described flat rate model. The scenario SAP 2013 is identical to REFERENCE until 2013 and is also followed by the flat rate model.

In order to control for random effects, the analysis is based on 20 independent replications of each scenario with different random number seeds for the initialisation of the locations of the farms, farmers' age, managerial ability and the vintage of assets. To reduce the number of necessary simulation runs, we used common random numbers, i.e., although initialisations are independent within a scenario, all scenarios use the same set of random numbers.

4. Results and discussion

This section is organised as follows. First, we analyse the short- (2013) and long-term (2020) effects of the progressive modulation as implemented in the final agreement (HC IMP) and the initial proposal (HC PROP) compared to the current implementation of the CAP (REFERENCE). We then examine the effects of a replacement of the current CAP by a uniform payment set at a drastically reduced level of € 150 from 2013 onwards.

Consequences of a progressive modulation of direct payments on farm structures in Saxony and Hohenlohe

As the extent of the progressive modulation depends on the amount of payments a farm receives, we first show the average modulation resulting from the modulation rates from the proposed and finally implemented scenario. In table 6, the average modulation rates for Hohenlohe and Saxony are displayed (compared to a situation without any modulation). For Hohenlohe, most of the payments go to farms that receive between € 5,000 and € 100,000. As the first € 5,000 are not modulated and no farm receives more than € 100,000, this results in an average modulation of 9.2% for the initial proposal and 7.1% for the agreement in 2013. For Saxony with the initial scenario, the average modulation is 15.6% in 2013 and is thus much below the maximum possible modulation rate of 22%. However, based on a premium volume of € 866 m. in 2007 (ZID, 2007) this would already result in a projected yearly modulation of € 135 m., of which approximately 10% to 25% would have to be co-financed by the Federal State of Saxony in order to be used for second pillar measures – which, however, are not considered in our simulations. The finally implemented agreement leads for Saxony to an average modulation rate of 10.5% which is about 50% higher than in Hohenlohe but only about 65% of the original proposal.

Table 6. Average modulation rates per farm in Saxony and Hohenlohe

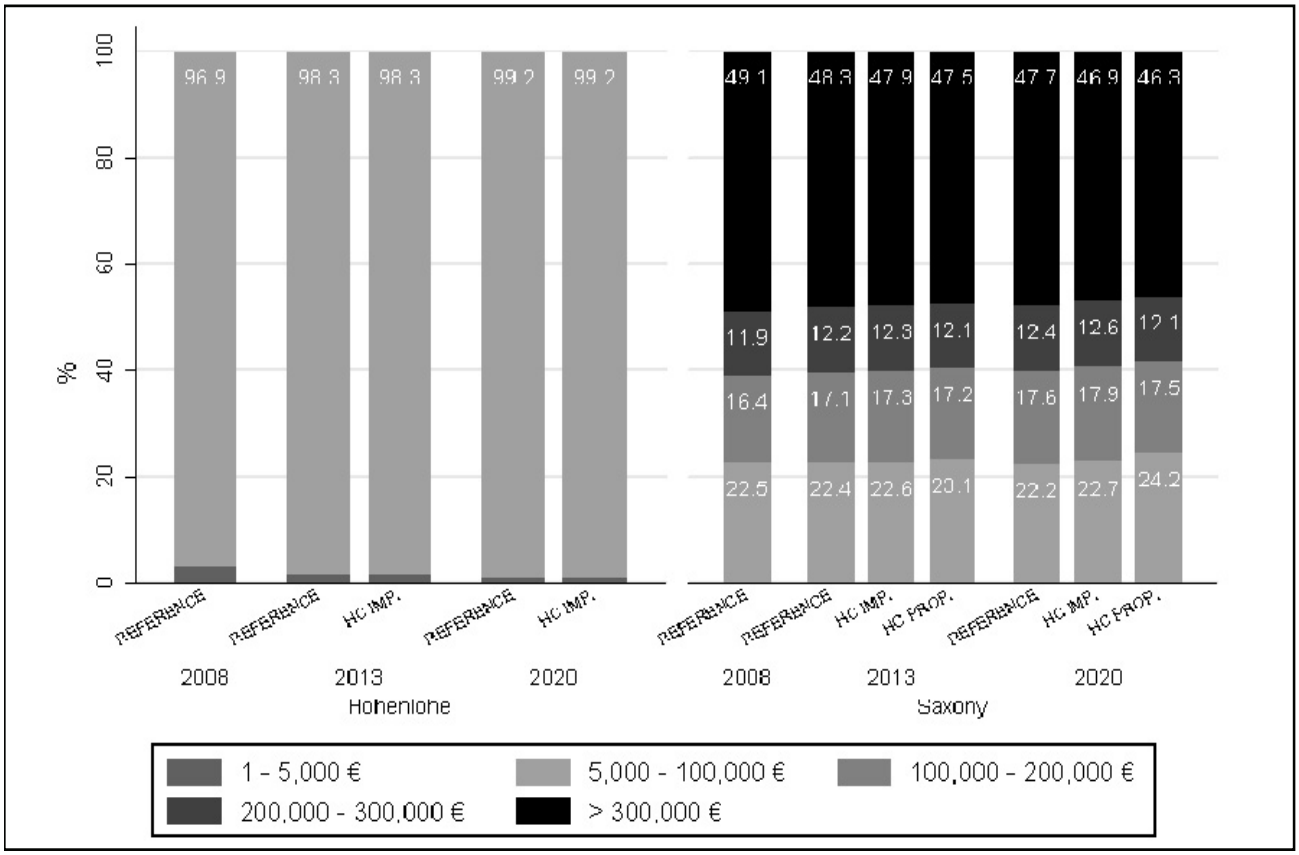
Year	Modulation (in %)			
	Hohenlohe (HC IMP)	Hohenlohe (HC PROP)	Saxony (HC IMP)	Saxony (HC PROP)
2009	4.6	4.6	7.7	10.1
2010	5.4	6.1	8.7	12.0
2011	6.2	7.6	9.6	13.9
2012	7.0	9.1	10.5	15.7
2013	7.1	9.2	10.5	15.6

Source: own calculations

To grasp the structural effects of the Health Check, farms are grouped according to their membership to a modulation group before the introduction of the policy (2008) with the acreage shares of each group displayed for the years 2013 and 2020 in figure 2.

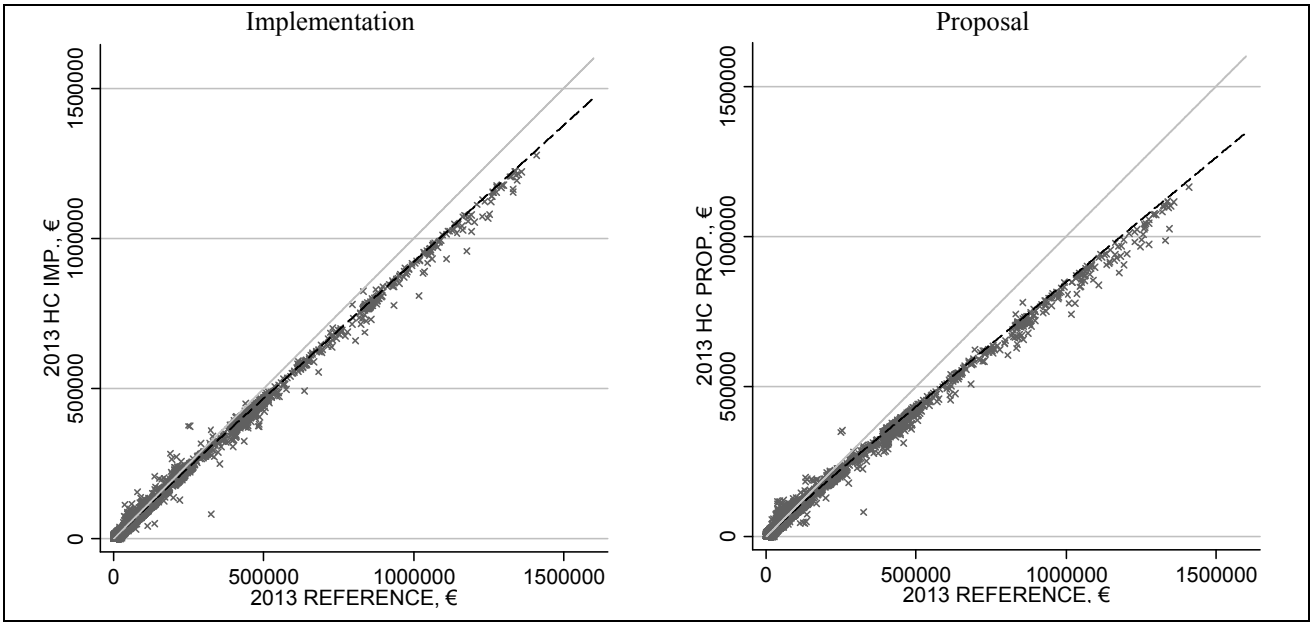
For Hohenlohe, the progressive modulation policy has almost no effect on the distribution of the farms over the modulation groups. Obviously, it is not forcing some of the small farms to shrink below the limit of € 5000, i.e., to become part-time farms. This holds both for the proposed and finally implemented scenario (whereas for clarity only the final implemented one (HC IMP) is displayed in the figure). The situation is, however, different for Saxony. Although the shifts in acreage shares between the modulation groups are not very pronounced for the final agreement we can see how the comparative advantages of smaller farms are gradually increasing starting from REFERENCE over HC IMP to HC PROP. For the latter the group of

Figure 2. Acreage shares of farms according to their belonging to a modulation group in 2013 and 2020 (the modulation group of a farm is fixed to the premium volume before the introduction of the HC in 2009)



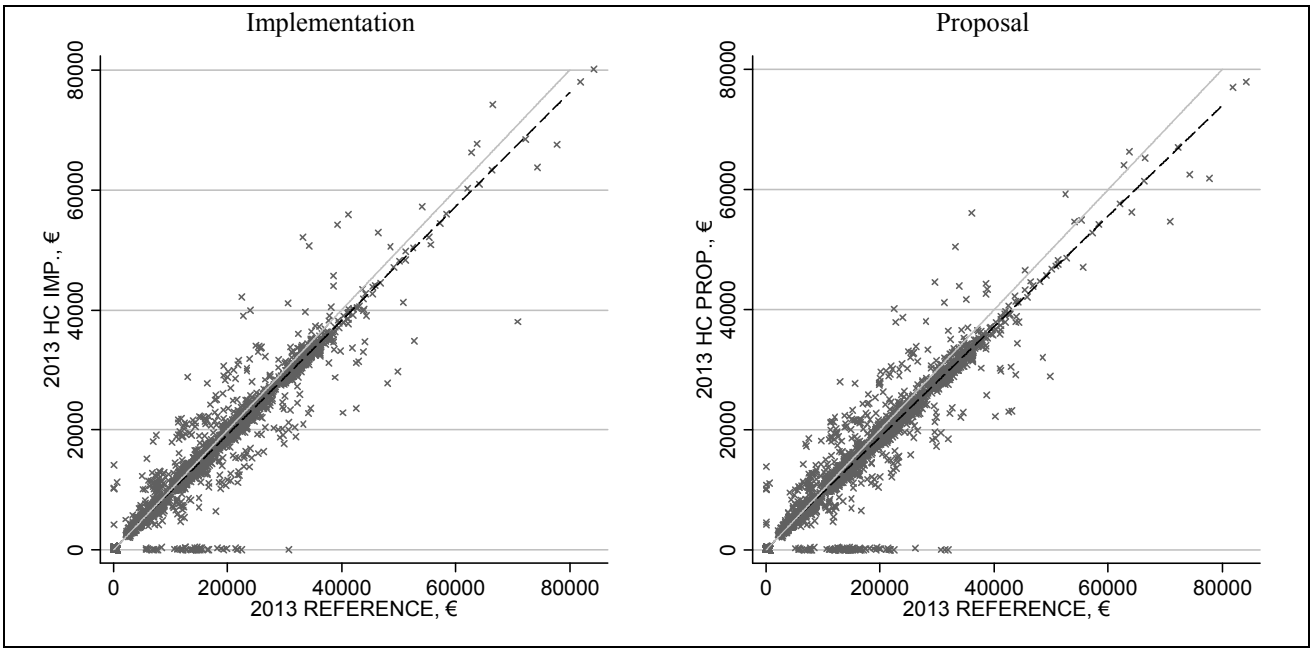
Source: own calculations

Figure 3a. Scatter plot of premium volumes of farms in 2013 in Saxony



Source: own calculations

Figure 3b. Scatter plot of premium volumes of farms in 2013 in Hohenlohe



Source: own calculations

smaller[5] farms with a premium volume below € 100,000 clearly benefits from the high modulation rates for farms with a premium volume above € 200,000, even in the short run. It should be noted that the absolute number of farms in each group remains constant between scenarios meaning that a declining share is caused by shrinking farms and vice versa. In the long run, with a continuation of the modulation rates after 2013, the relative advantage of the farms below the limit of € 100,000 even increases. Whereas farms below € 100,000 would shrink in REFERENCE, the reverse would be true in the HC scenarios, especially in HC PROP. That is, we could state that especially for smaller farms, the progressive modulation would cause a structure preserving effect at the cost of very large farms.

To illustrate this reallocation of agricultural land between farms, figure 3 shows scatter plots with the premium volumes of each farm for the REFERENCE scenario versus those of the HC IMP respectively HC PROP scenario for all replications. In addition to the bisector line through the

[5] The terms very small, small, medium-sized, large and very large farm are used with respect of the belonging to a modulation group. In terms of farm sizes this means up to 16 ha for a premium volume below € 5,000, 16-292 ha for a premium volume between € 5,000 and € 100,000, 292-541 ha for a premium volume between € 100,000 and € 200,000, 541-811 ha for a premium volume between € 200,000 and € 300,000 (calculated based on the average premium per ha paid in 2008 for both regions).

Table 7. Differences in economic land rent (ELR) and rental prices (RENT) in 2013 between HC and REFERENCE

Size class of payment (in €)	Saxony (Imp.)		Saxony (Prop.)		Hohenlohe (Imp):		Hohenlohe (Prop.)	
	Δ ELR (€)	Δ RENT (€)	Δ ELR (€)	Δ RENT (€)	Δ ELR (€)	Δ RENT (€)	Δ ELR (€)	Δ RENT (€)
< 5,000	-	-	-	-	9	-15	15	-25
5,000 - 100,000	-18	-2	-29	-3	-12	-5	-18	-8
100,000 - 200,000	-19	-2	-32	-3				
200,000 - 300,000	-20	-2	-36	-4				
> 300,000	-27	-4	-54	-7				

Source: own calculations

origin, a dotted line is included which reflects the rate of modulation and illustrates how farms adjust to the policy. Farms which lie on the dotted modulation line lose only payments because of the progressive modulation, but farms below or above the modulation line react to progressive modulation by either shrinking or growing. For Hohenlohe, we can state that both the final agreement and the initial proposal lead to a slightly faster structural change compared to REFERENCE in the sense that more farms leave the sector when the policy is introduced. As some farms quit (i.e., they receive zero premiums in the HC scenario) others can increase their acreage and hence the premium volumes for these farms increase. Nevertheless, on average these adjustments are congruent with the modulation line for both scenarios. In Saxony the picture is different. In HC PROP many large farms are disproportionally affected, resulting in a decreasing curvature of the graph. We can see that farms with a premium volume above € 800,000 particularly shrink under the conditions of the initial proposal, and this is already prior to 2013. For the final agreement the partial disadvantages for large farms are less pronounced. The reason is that in the end all relevant farms are affected by the modulation and large farms are facing additional cuts of "only" 4% for payments over € 300,000.

This becomes obvious if one looks at the development of economic land rents (ELR) and rental prices (RENT) per ha as displayed in table 7. For the original proposal the average loss would be up to € 54 per ha for large farms and the average additional loss for these farms compared to farms with payments below 300,000 € would be about € 20 based on the total acreage of a farm. Comparing farms between € 5,000 and € 100,000 and farms above € 300,000 the losses for the latter ones are almost twice as high. For the final implementation farms could loose up to € 27. The additional losses for farms with payments above € 300,000 are only € 7 per ha based on the total acreage of the farm compared to farms getting less than € 300,000. To some extent these losses are compensated by a slower increase of rental prices. That the effect of compensation is not higher in Saxony basically results from the comparatively low rental rates compared to the profitability of farms in Saxony and a delayed adjustment through long-term rental contracts. Overall we can conclude that the decrease of economic land rent is much below what would have been expected given the modulation rates of the proposal and the final agreement. To some extent the losses are compensated by an increasing efficiency of the surviving farms.

For Hohenlohe, in contrast the income losses are moderate both for the final agreement and the initial proposal, where farms would face an average additional loss of € 4.

Drastic cuts in regional payments from 2013 and marginal influence of former cuts through the Health Check policy

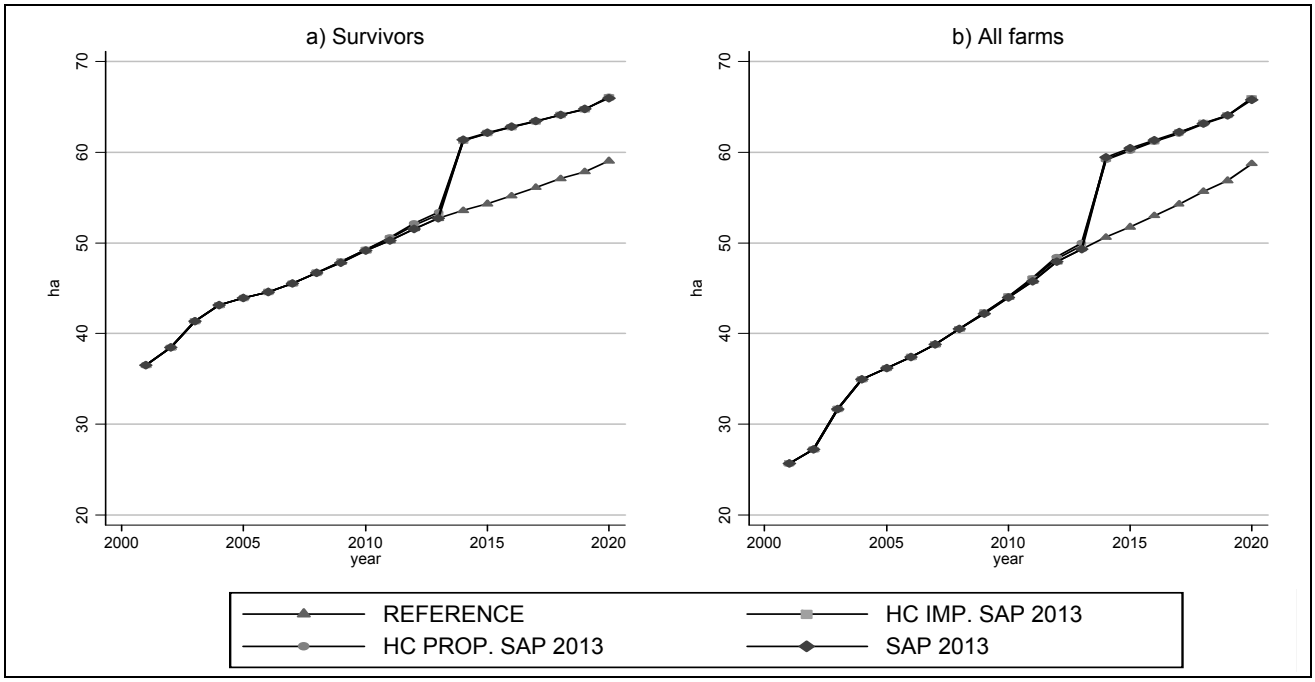
In the second part of the analysis, the objective is to find out whether a progressive modulation would help farmers to better cope with a probably strongly decreased regional area payment introduced in the future, which might be the case after the current financial planning period, which ends in 2013. In order to analyse this, we introduce one scenario in which we continue the current CAP and start with a uniform payment of 150 €/ha in 2013 (SAP 2013), and two which are equal to HC IMP respectively HC PROP till 2013, followed by the uniform payment as in SAP 2013 (HC IMP SAP 2013, HC PROP SAP 2013).

In figure 4, the development of average farm sizes in Hohenlohe is displayed for: a) those farms which survive in all scenarios; and b) all farms in each scenario. For Hohenlohe almost no sample effect can be observed, which means that all farms are affected in the same way by the policy. However, in 2013 the introduction of the uniform payment causes a strong adjustment reaction. For Hohenlohe we can observe an annual growth rate in average farm sizes of up to 17% compared to 3-4% for the other years. Furthermore, simulation results show that there is no difference in structural change depending on whether a progressive modulation policy was applied before 2013. This observation is true independently of whether the final agreement or the initial proposal is applied.

In Saxony, the situation is entirely different (c.f. figure 5). First of all there is a much stronger sample effect than in Hohenlohe. Despite the progressive modulation of the Health Check policy, most farms which leave are smaller farms. This development is even fostered with the introduction of the uniform payment in 2013. Obviously, small farms are more affected by the reduction of payments than larger farms. However, when comparing both HC scenarios (HC IMP SAP 2013, HC PROP SAP 2013) with SAP 2013 one can see that a progressive modulation policy slows down structural change in both cases. Obviously cumulative income effects lead to the situation that some small farms could better cope with the drastically reduced payments in case of a SAP policy. This is an interesting observation, since we have shown above structural effects would have been small with a continuation of the HC policies. However, one may ask whether this would just prolong a structural adjustment process which would take place anyway.

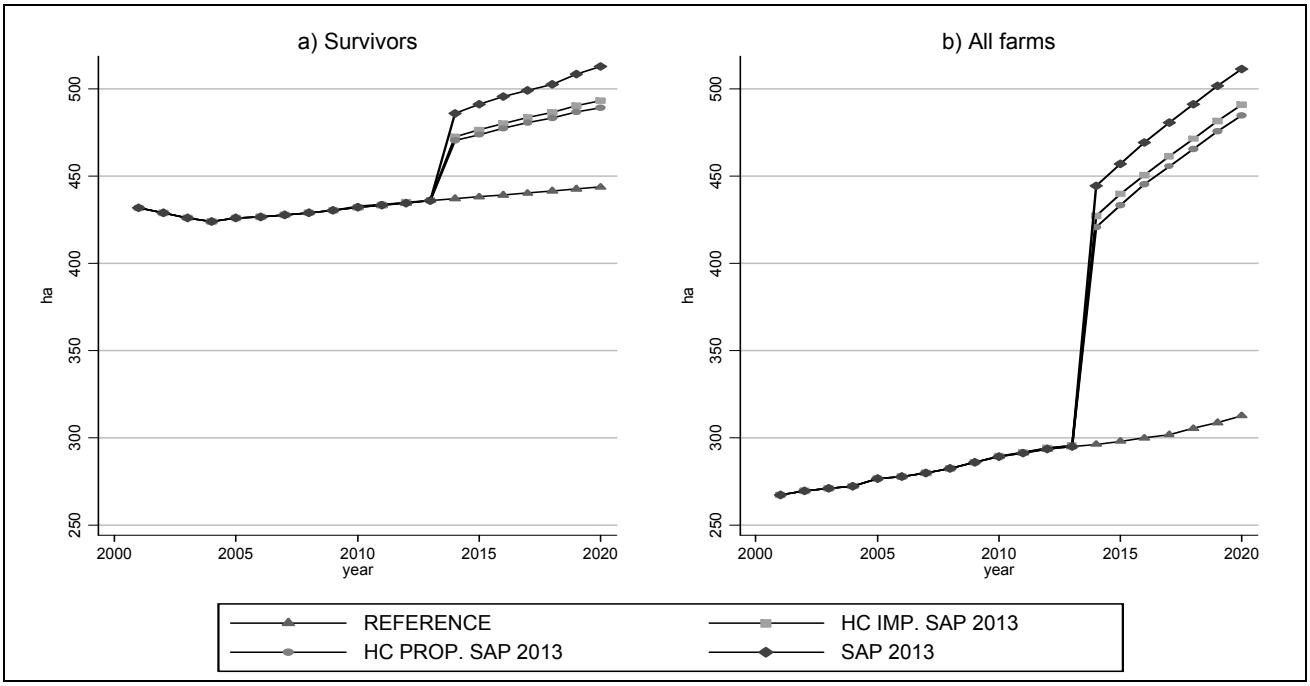
To examine this issue more closely, in figure 6 again the acreage shares according to the premium volume before the introduction of the HC policy are displayed for all six scenarios for 2020 (for Hohenlohe we skipped the initial

Figure 4. Development of average farm sizes in Hohenlohe



Source: own calculations

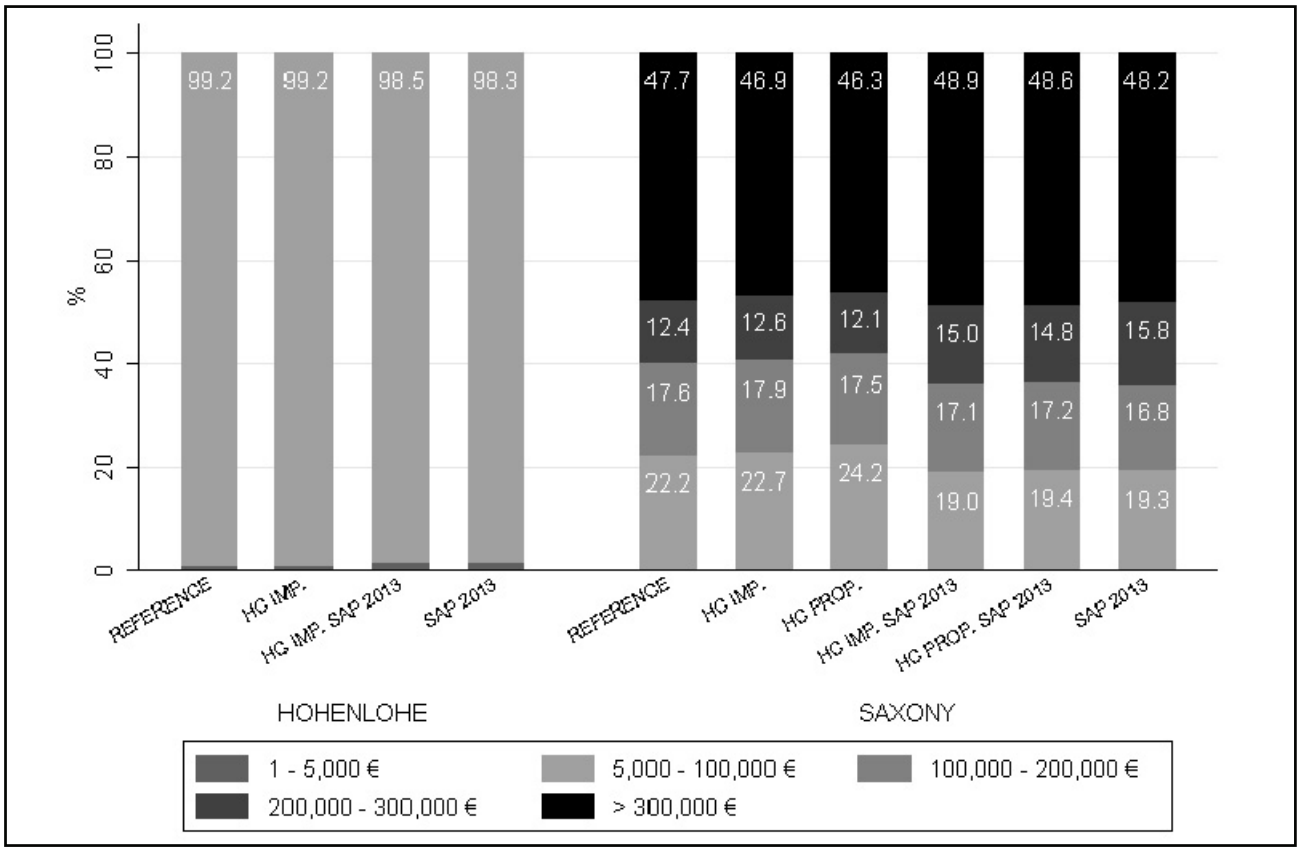
Figure 5. Development of average farm sizes in Saxony



Source: own calculations

proposal, i.e. HC PROP and HC PROP SAP 2013). Although we can see that for HC IMP, the long run effects are small, the situation would have been different for the initial proposal HC PROP. Figure 6 illustrates that in Saxony, in case of a payment reduction in 2013 (HC PROP SAP 2013 and SAP 2013), farms with a premium volume below € 100,000 still benefit from the progressive modulation of the initial proposal (compare HC PROP SAP 2013 and SAP 2013) – however, to a much lower extent than if progressive modulation would be continued (no payment reduction, compare REFERENCE and HC PROP). With the introduction of strongly reduced area payments after 2013, farms between € 5,000 and € 100,000 would especially lose acreage shares at the level of 5% (compare HC PROP and HC PROP SAP 2013). Moreover, for this group, even the preserving effect of the HC PROP policy diminishes. No significant difference between HC PROP SAP 2013 and SAP 2013 could be observed in 2020. The same – but in an opposite direction – would apply for very large farms with a premium larger than € 300,000: this group would benefit most from a uniform payment, as its acreage share increases at the level of about 2% in the case of an SAP policy (com-

Figure 6. Comparison of acreage shares in 2020 according to premium volume (based on premium volume before policy introduction)



Source: own calculation

paring HC PROP with HC PROP SAP 2013). In the comparison of REFERENCE and HC PROP, the progressive modulation of the Health Check proposal would foster the shrinkage of very large farms. By introducing the reduced uniform payment, this effect diminishes and differences between HC PROP SAP 2013 and SAP 2013 are no longer significant in 2020.

For all SAP scenarios we can conclude that through a radical cut of payments, the competitive situation is weakened for small farms and strengthened for very large farms, independent of whether there was a HC policy implemented before 2013. Thus one can argue that HC PROP would have caused misleading effects which would be corrected if in 2013 a strongly reduced single area payment would be introduced.

5. Summary

In the present paper we analyse some possible pathways of the CAP currently under discussion by using the agent-based model AgriPoliS as an experimental framework. In the short run, the focus is on the effects of the finally implemented and initially proposed Health Check policy regarding the effects of the progressive modulation. Due to the specific farm structure in Germany, especially with large farms in Eastern Germany, this part of the Health Check proposal is of particular relevance. To quantify the effects of the progressive modulation, we defined a reference scenario reflecting the current CAP and two other scenarios with a progressive modulation introduced stepwise beginning in 2009 as finally implemented and initially proposed. Regarding the further development of the CAP, it is most likely that the progressive modulation as proposed in the Health Check would constitute a first step towards a further decrease in direct payments. Such a scenario has been modelled by a single area payment at a drastically reduced level of only 150 €/ha from 2013 onwards, which is the end of the planning period of the Health Check policy.

In order to reflect the range of farm structures in Germany, the model was calibrated to a small structured intensive livestock region in the northeast of Baden-Württemberg (Hohenlohe) and to a large-scale structured arable farming region in Saxony.

For the initial proposal, the effective modulation is far below the maximal possible modulation rate of 22%, even in Saxony. Nevertheless, a modulation rate of 15.6% in Saxony is not a negligible amount of payments that may be lost for the sector. This is directly reflected in the income situation of the farms, which may lose in average up to 54 €/ha according to our simulations. For the final agreement the average modulation for Saxony reduces to 10.5% meaning that the effect of the progressive modulation almost diminishes on average. For Hohenlohe the effective modulation would be 7.1% for the final agreement and 9.2% for the initial proposal.

Regarding the structural effects, the progressive modulation as finally agreed upon by the EU Council has only small effects on the farm size development or the acreage shares of the different modulation classes. This holds for Hohenlohe as well as for Saxony. For the initial proposal, the situation would have been different. Whereas there would be almost no structural effects in Hohenlohe, both in the

short- and long-term, in Saxony, the initial proposal of a progressive modulation would have caused a comparative advantage for small- and medium-sized farms. Especially small farms which would otherwise lose acreage or exit may even increase their share.

In a further step of our analysis we analysed a SAP policy at a drastically reduced level of payments to determine whether we could observe different effects depending on the previously progressive modulation according to the Health Check. Overall, a uniform payment at a drastically reduced level would substantially speed up structural change. Especially small farms would be pushed out of the sector while bigger farms would grow faster. Again, under the conditions of the final implementation structural effects would have been smaller compared to the initial proposal. However, cumulative income effects of the progressive modulation policy lead to the situation that some small farms could better cope with the drastically reduced payments in case of a SAP policy. For the initial proposal followed by a SAP policy we can conclude that the strengthening and weakening effects of the progressive modulation were not sustained in the same way for all farm size classes after the introduction of the reduced uniform payment, as one may expect. Both for very large (above € 300,000) and small (below € 100,000) premiums, the effect of SAP was independent of the presence of progressive modulation. With regard to the question whether the progressive modulation would allow for a continuous policy, it can be stated that the initial proposal would have offered up no clear perspective, as, depending on the prevailing farm structure, no clear conclusion of the structural effect of a subsequent policy could be drawn. Although with the final agreement these effects are much less pronounced the progressive modulation still could provide the wrong signals to farmers, as it is most likely that future reforms will come along with less support and thus require a stronger market orientation for farms. However, the exact use of modulated funds in the second pillar is not known at the moment. Important redistributive aspects through the reallocation of these resources may have to be considered to tackle the full consequences of a progressive modulation on structural change, as reductions within the first pillar may offer options for second pillar measures.

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