Policy risks through modulation of direct payments: Can farms live with a strategic disadvantage?

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Policy risks through modulation of direct payments: Can farms live with a strategic disadvantage?[1]

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Abstract

This paper explores the impacts of modulation as suggested by the EU Commission ("Preparing for the "Health Check" of the CAP reform", 2007). The agent-based model AgriPoliS has been adapted to the case study region Ostprignitz-Ruppin (Brandenburg, Germany). Impacts on farm structures, regional production and the distribution of profits throughout farms are investigated, as well as impacts of the transfer of money coming from modulation to a second pillar measure widely spread in the case study region. The relative gains or losses of farms depending on their modulation groups are documented and potential expectations on such policies discussed.

Keywords: modulation, CAP, decoupling, agri-environmental payments.

1. Introduction

Modulation of direct payments from the first to the second pillar of the Common Agricultural Policy (CAP) is currently under discussion for the Health Check (EU Commission 2007). The introduction of new "single farm payments" from 2005 aimed at severing the link between subsidies and production while making farmers more market oriented and providing necessary income stability (EU Commission 2003). It is however unclear how an increasing transfer of payments from the first to the second pillar through modulation affects political goals like income maintenance and stabilisation, while at the same time promoting the supply of non marketable goods. Moreover, it is interesting to investigate which farms could potentially benefit from this switch, and why. Symmetrically, the identification of potential losers could help to sketch possible adjustments to modulation policies. Hence, we ask which farms win and lose from such a policy. Is it possible that farms losing support through modulation also benefit from increased rural development payments?

We will investigate these questions in the case study area Ostprignitz-Ruppin (OPR), located in the federal state of Brandenburg, 100 km in the North-West of Berlin in Germany. In this area where the unemployment rate was of 19,6% in 2002 (Wirtschafts- und Landwirtschaftsbericht 2002), the agricultural sector plays an important role: 8% of the active population was employed in this sector in 2004, the double than the average in Brandenburg (Landesamt für Bauen und Verkehr 2006). A decline of farming activities would then represent a risk for future rural viability, rural employment, and occupation of land. As regards farming structure, OPR has inherited a rather dual structure as regards farm sizes like in other ex-GDR federal states. Lots of smaller family farms cohabit with very large farms which were collectivized farms in former times. Due to their sizes and production structures, these big farms are keen to be concerned by modulation policies through the reduction of their direct payments.

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In this paper, we use the agent-based simulation model AgriPoliS (Agricultural Policy Simulator). It has been adapted to OPR in terms of agricultural structure, accessible production activities, soil heterogeneity and agricultural prices. Among the panel of second pillar measures and because of its high acceptance in OPR[2], the Agri-Environmental Measure (AEM) "extensive use of grassland" is introduced in the model. Its implementation on an area of at least 30% of the total land of the farm allows the farmer to get an Agri-Environmental Payment (AEP) of 130 Euros per hectare of extensive grassland. Indirectly, this measure supports the extensive production of ruminants in addition to first pillar payments. The programme's future success may also be influenced by decoupling, especially since direct payments for suckler cows and beef cattle were transferred into the single farm payment with the CAP reform. We will first investigate the general impacts of a decoupling policy in the form of a single farm payment by comparing it to a reference scenario where payments stay coupled (Agenda 2000 policy). After that, we will compare two distinct scenarios: decoupling with modulation or decoupling without modulation. It will allow us to analyse the impacts of modulation on farms either undergoing modulation at different degrees or not modulated at all. Finally, impacts of the transfer of payments from the first pillar to the second pillar will be investigated by increasing the level of AEP per hectare of extensive grassland. The optional nature of the AEM modelled will help us to detect from which point its attractiveness does economically make sense for farms in the model. At the end of the paper, impacts of the policies modelled on public expenses, among other issues, will be discussed.

2. Material and methods

2.1. Model description

The following description of AgriPoliS is established following the ODD protocol (for Overview, Design concepts and Details) as described in GRIMM *et al.* (2006).

Purpose. AgriPoliS is a spatial and dynamic agent-based simulation model of structural change in agriculture (KELLERMANN e*t al.* 2007, HAPPE *et al.* 2006, HAPPE 2004). The main purpose of the model is to understand how farm structures change in rural areas, particular in response to different policies. AgriPoliS maps the key components of regional agricultural structures: heterogeneous farm enterprises and households, space, markets for products and production factors. These are embedded in the technical and political environment.

State variables and scales. The model comprises different hierarchical levels: farm agents, plots, regions, farm population, and political environment. Farm agents are characterised by state variables such as age, factor endowments (land, capital, labour), ownership structure, location in space, type, managerial ability, full time or part-time farm. In order to produce, farm agents utilize different production factors of different types and capacities. Farm agents comprise the population of all agents in the region. Plots represent physical land units or cells, each of which is 1 ha in OPR. Plots exist in different forms: owned/rented, arable and grassland of different quality (low, medium-low and medium high), distance to farmstead, non-agricultural land. Together, plots/cells form the region. The political environment is delineated by the predominant agricultural policy setting, which affects farm agents, e.g., by way of direct payments, agri-environmental programmes, or limits on stocking density.

Process overview and scheduling. The model proceeds in annual steps. In each year the following steps are processed for each farm: set policy, land auction, investment, production, update product markets, and assess period results, exit decision.

Adaptation: Farm agents adapt to changing conditions on markets and to policy changes by changing their production mix. Farm agents can engage in production activities, labour allocation, rental activities for land, production quotas, and manure disposal rights. Labour

[2] In OPR, 43% of all grasslands were granted in the framework of this measure in 2002 (ZALF 2003).

can be hired on a yearly or hourly basis; farm family members can work off-farm. To finance farm activities farm agents can take up long-term and/or short-term credit. Liquid assets not used on the farm can be invested. A farm agent leaves the sector if it is illiquid or if the opportunity costs of farm-owned production factors are not covered. A successor takes over the farm operation if the expected farm income is at least as high as the potential salary he could expect in the industry.

Behaviour: Farm agents maximise farm income. To derive the farms' actions, a mathematical programming approach is used as a means of combining various farm production activities and investment choices given the farm's resource constraints.

Prediction: Farm agents form expectations about future prices based on adaptive expectations. They anticipate the impact of major policy changes one period in advance. A farm agent does not act strategically.

Sensing: Farm agents are assumed to know their own state and endowments so that they can apply their behavioural rule. They take into account expected prices for products. Even though farm agents act individually rationally, farm agents' behaviour is rational because they do not take other agents' actions into account. Farm agents sense the state of all plots in the region, and hence can determine which additional plot they wish to rent.

Interaction: In AgriPoliS, farm agents interact indirectly via markets for production factors land, labour and capital, and on product markets. The population of farm agents is derived from FADN-data in a reference year. Farm agents are further individualised with respect to production costs, location, age, and the age of the assets. Technical coefficients and gross margins of production activities are based on standard indicator sets. Markets for products, capital and labour are coordinated via a simple price function with an exogenously given price elasticity and a price trend for each product[3]. The land market is implemented as a land rental auction. It is modelled as a sequential first-price auction. Rental contracts are renegotiated each year, meaning that only plots of no economical interest anymore for the farm are let to the land market, thus to other farms for rent.

Observation: The model produces results at the sector level as well as for each individual farm at each time step on economic indicators, production, and investment. Some results are attached with spatial information.

2.2. Region description

Initially, we derived 23 farms from the regional FADN database, and weighted them to reproduce the OPR agricultural structure in the start year 2002. Farm capacities (land, capital, labour input and animal productions) are thus based on empirical data. In the model they evolve from one period to another given the decisions the farm agent has taken to maximize its household income. Their technical orientation and the size class they belong to coupled to the weight they have been given, respects the regional statistical data best (KELLERMANN e*t al.* 2007, SAHRBACHER *et al.* 2005). The heterogeneity in farm sizes is reproduced as well: very large farms are to be found in OPR nearby smaller family farms. Soil heterogeneity has been reproduced too. Three arable land soil qualities (low, medium-low and medium-high) defined as regards potential agricultural yields, and two grassland soil qualities (low and medium quality) have been introduced, based on the real soil quality distribution in OPR. From a total of 120,957 hectares of Utilised Agricultural Area (UAA) in OPR, grassland constitutes 26,7%. The starting regional structure is described in the Table 1 below.

[3] It is differentiated between interest rates for long-term borrowed (5.5%) and short-term borrowed capital (8%) and for equity capital (4%; all values DEUTSCHE BUNDESBANK 2003). For hired labour we assume an annual increase of 0.5% for costs for hired labour. In these simulation experiments we assumed output prices to stay constant.

Table 1. Farming structure of OPR in 2002

Number of farms per legal form	Individual farms	426
	Partnerships, other legal forms	156
Number of farms per size class	<50 ha	359
	between 50 and 200 ha	90
	between 200 and 500 ha	65
	between 500 and 1,000 ha	32
	larger than 1,000 ha	39
Number of farms per technical orientation as defined in the FADN database	Field crops	214
	Dairy	46
	Specialist grazing livestock	294
	Specialist granivores	9
	Mixed	22
Animal productions (heads)	Dairy cows	12,115
	Suckler cows	17,176
	Beef cattle 1-2 years	16,743
	Breeding sows	4,412
	Pigs for fattening	11,648

Source: Landesbetrieb für Datenverarbeitung und Statistik, Land Brandenburg, 2003.

It is important to note that the lines of livestock productions differ depending on the availability of land. While pigs and sows are assumed to be fed with concentrates and bought cereals included in the variable costs for these activities, dairy cows, beef cattle and suckler cows have to be fed with roughages and grassland products produced on the farm. In the case of suckler cows, half of their yearly foods come from pastures on grasslands. This is important to keep in mind to better grasp the main consequences of the policies modelled.

3. Policy scenarios description

First, in all scenarios modelled, the second pillar AEM "extensive grassland" is introduced as an incentive for farmers to use parts of their grassland extensively (MLUR 2002). Farms have to use at least 30% of their total UAA as extensive grassland in order to receive the AEP of 130 Euros per hectare of converted land. Each hectare of this activity requires labour, machinery and capital, but it also provides extensive pasture land for ruminants. The stocking density of ruminants should not exceed 1,4 livestock units (LU) per hectare on this type of land. Grassland used in the framework of the AEM is named "AEP grassland". AEP grassland constitutes an indirect way for farms to get support for ruminant production. This is important to keep in mind since participation in the AEM, and thus the incentive to produce ruminants extensively, is highly depending on general decoupling conditions determining the level and the mode of distribution of first pillar payments. The decisive advantage of the simulation based method used in this paper is that each farm individually takes the decision to convert parts of its land into AEP grassland, given the specificities of its spatial, economical and political environment. Each farm's individual decision making process takes place dynamically and provides an original way to grasp the success of this agri-environmental programme in the region modelled.

The first policy scenario consists in the continuation of Agenda 2000 policy. Direct payments are distributed as described in Table 2 in each of the 20 simulation periods (1 period = 1 year). Results of the Agenda 2000 scenario aim at grasping the general state of agriculture in OPR if first pillar payments had stayed directly coupled to land and animals. Prices remain constant during the whole simulation

Table 2. Direct payments based on the Agenda 2000 policy in OPR from 2002

Unit	Cereals	Protein plants	Grassland	Dairy cows	Beef cattle	Suckler cows
€/ha or €/head	285	328	0	31	207	316

Source: Landesbetrieb für Datenverarbeitung und Statistik, Land Brandenburg, 2003

As regards the second scenario, direct payments are decoupled and transferred into a Single Farm Payment ("SFP scenario")[4]. The SFP consists of the complete transfer of first pillar premiums into a farm specific payment from the year 2005 onwards. To do this, the average of the total premiums received over the time interval 2002-2004 is calculated in the model for each farm. Then, starting in 2005, the total farm payment is divided up into payment entitlements per hectare of the farm's UAA. The payment entitlement is redistributed to each plot a farm occupies. Payment entitlements differ within the region from plot to plot[5]. Knowing this, farms decide each year on how much land they will let or lease. Following this, each farm calculates the total annual eligible payment, which is directly paid to the farm. It is given independently from the farm's future production system. However, farms receive this payment only if they keep their land in Good Agricultural and Environmental Conditions (GAEC)[6].

In the third policy scenario, the same policy conditions than in the SFP scenario are implemented. In addition to this, modulation is introduced according to the boarders suggested by the EU Commission for the Health Check of the CAP Reform (EU Commission 2007). The farm specific payment is being modulated under the following conditions:

- farm payment comprised between 100,000 and 200,000 Euros: modulation of 10%;
- between 200,000 and 300,000 Euros: modulation of 25%;
- more than 300,000 Euros: modulation of 45%

The modulation takes place from the first year of decoupling reform in 2005 and lasts until the end of the simulation after 20 years. This policy scenario is named "SFP mod".

The last three scenarios model the redistribution of modulated payments to the benefit of the second pillar AEM implemented by increasing the AEP from 2005 onwards. Three different levels have been chosen: 274, 300 and 342 Euros/ha. Explanations on the choice of these levels will be provided in section 4.3.

Table 3 summarises the policy scenarios implemented in this paper.

Table 3. Description of the policy scenarios modelled

Name of scenario	**General policy settings**	**Modulation (yes/no)**	**AEP distributed for extensive grassland (Euros/ha)**
Agenda 2000	Continuation of Agenda 2000 policy after 2005	no	130
SFP	In 2005, decoupling towards a single farm payment, subject cross-compliance	no	130
SFP mod		yes	130
SFP mod [AEP]		yes	274, 300 or 342

[4] The policy implemented in this scenario is a "pure" Single Farm Payment". It differs from the German hybrid dynamic decoupling policy consisting in combining a regional payment with a specific farm payment until 2013.

[5] There is no market in the model for the exchange of payment entitlements. These payments stay linked to each plot.

[6] This is known as the "cross-compliance" condition.

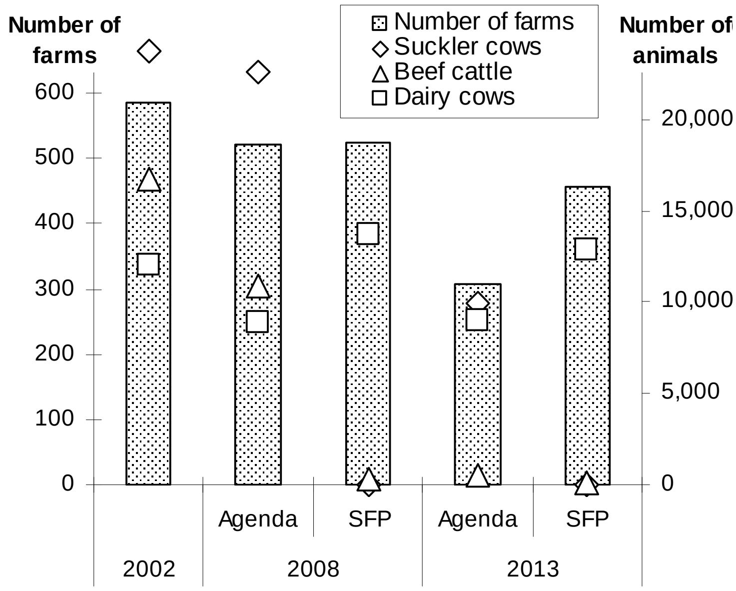
4. Results and discussion

In this section, policy scenarios described above will be compared. First, general impacts of decoupling are investigated by comparing scenarios SFP and Agenda 2000. Then, SFP and SFP mod will help to make an overview on some impacts of modulation, but without redistribution to the second pillar. The last part includes the redistribution of first pillar payment to the second and discusses what impacts could be expected.

4.1. Implementation of a Single Farm Payment: main features

As shown in Figure 1, the main consequence of decoupling direct payments is the fall in the number of ruminants at the regional level. Only dairy production remains attractive in the SFP scenario after the policy change.

Figure 1. Development in the number of farms and animals in OPR between Agenda 2000 and SFP scenarios

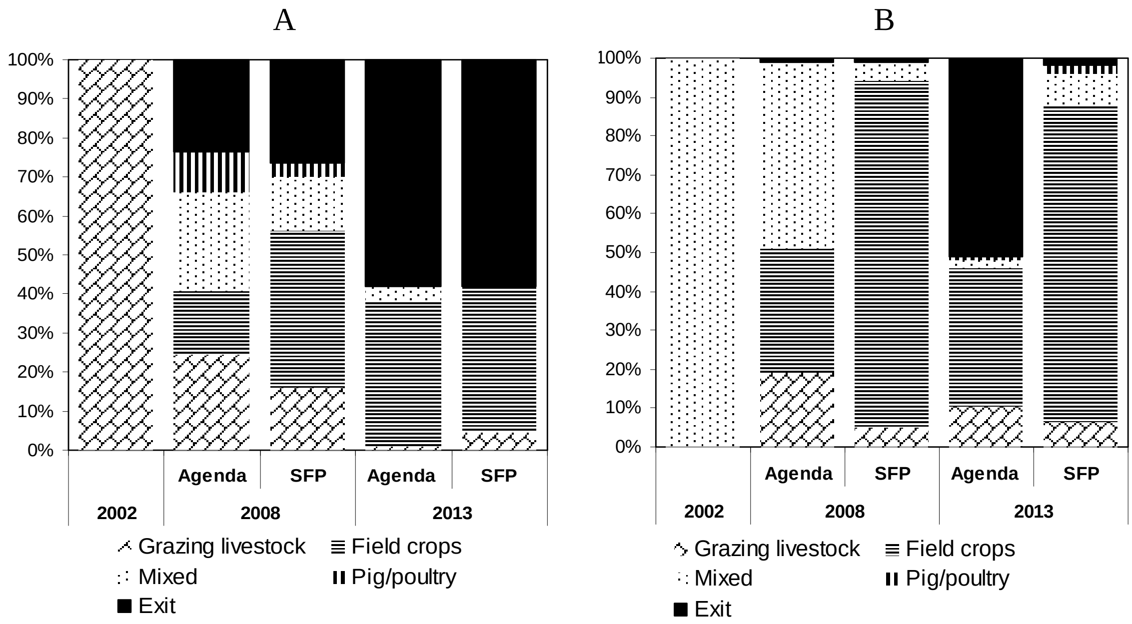


Source: own calculations.

With the introduction of the single farm payment, the decrease in the number of farms is slowed down as shown in Figure 1. On the opposite, the abrupt fall in the number of ruminants occurs very fast after the policy change. This is also reflected in the technical orientation of farms (Figure 2). By abandoning animal production, grazing livestock and mixed farms change their farm type during the simulation[7]. While half of all mixed farms present at the beginning of the simulation have closed down in the Agenda 2000 scenario in 2013, they are still active in the SFP scenario. In this latter scenario, they abandoned animal production and kept their grassland in GAEC.

[7] In AgriPolis farm types are defined according to the FADN definition (EU Commission 1985). If the total gross margin of a farm is generated by more than 66% from one production area (crops, ruminants, pig or poultry), then the farm is classified as respective farm type. If no production area dominates the farm is classified as mixed farm.

Figure 2. Evolution of the types of farms initially classified as grazing livestock (A) and mixed farms (B) in the Agenda 2000 and SFP scenarios

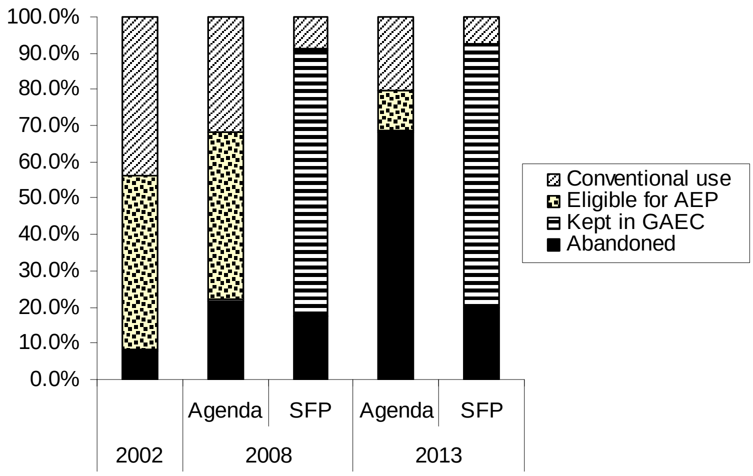


Source: own calculations.

Participation in the AEM is another indicator for the relative low attraction of ruminant productions after the policy switch as well. While in the year 2008 61% of all farms still manage at least 30% of their land as AEP grassland in the Agenda 2000 scenario (only possibility to get a payment for grassland as indicated in Table 2), this proportion falls to 0% in the SFP scenario.

Actually, the possibility to simply keep grasslands in GAEC seems more attractive for farms which had animals before the reform in the SFP scenario. This option, widely used by farms, provides one explanation for the low rate of grassland abandonment throughout the region as shown in Figure 3.

Figure 3. Grassland uses in Agenda 2000 and SFP scenarios



Source: own calculations.

As a conclusion, the decoupling of direct payments, formerly linked to land or animals, has strong impacts on production structures at the regional level. In particular, with the removal of direct payments for ruminants, the incentive to keep grasslands in a level of production higher than keeping it in GAEC has become much weaker. Seen the other way around, AEM are only taken up in conjunction with coupled payments. Without these, the use of grassland under GAEC is more attractive.

Now that the main features of the decoupling policy have been described, modulation of the individual farm payment is introduced at the same time as the policy switch, in 2005. Profit and production changes will be investigated in the next section while comparing the two decoupling scenarios with or without modulation, especially by those farms which will undergo modulation of their specific public support.

4.2. Impacts of a modulation of direct payments in OPR: who loses, who wins?

Impacts of modulation in addition to the decoupling reform implemented in these experiments can be assessed by comparing the two scenarios SFP and SFP mod. The only difference between these two scenarios is the introduction of ceilings on farm payments received leading to a partial removal of payments as described above.

First, there are no big differences to be observed between the two scenarios at the regional level. Structural change follows the same trends, as regards number of farms, animal husbandry and land uses (land abandonment, land kept in GAEC, development of AEP grassland). Differences arise at the individual level and between "modulated"[8] farm groups.

Then, what do these groups look like? In Table 4 farms are classified into four groups with respect to the level of direct payments they receive in 2005 in the SFP mod scenario (before modulation). Group 0 subsumes farms with less than 100,000 Euros of payments and no modulation. Farms receiving between 100,000 and 200,000 belong to Group 1: the modulation rate is of 10% in this group. In Group 2, farms received between 200,000 and 300,000 Euros: the modulation rate is of 25%. In Group 3 farms received more than 300,000 Euros: the modulation rate is of 45%.

The majority of modulated farms affected by modulation is, as one could have expected, rather large with an average size of 907 hectares over the three groups. They account for not more than 20% of the total number of farms, but occupy 78% of the total regional UAA. Constituted of a majority of partnerships and legal entities, farms affected by modulation are mainly field crop farms, the largest modulated farms owning dairy cows as well. They do not abandon this production after the policy switch to the contrary of suckler cows and beef cattle productions which are generally given away by the majority of farms throughout the region.

Table 4. Farm structures in each modulation group in the scenario SPF mod in 2005

		Group 0	Group 1	Group 2	Group 3
	Number of farms	433	65	21	18
Per legal form	Individual farms	374	7	0	0
	Partnerships	29	23	0	0
	Other	30	35	21	18
Per farm type	Pig and poultry	4	0	0	0
	Grazing livestock	34	1	2	2
	Field crops	377	63	5	0
	Mixed	18	1	14	16
	Size distribution (ha)	19 - 260	231 - 697	938 - 1,066	1,087 - 2,610
	Average farm size (ha)	59	450	1,009	2,186

Source: own calculations.

Modulation could be considered as a disadvantage for those undergoing it, as part of their payment is cut. But has it got any impact on farms at all? If yes, does it force modulated farms

[8] Although the term "modulated" could seem quite uncomfortable, it will be used to name farms, or groups of farms, directly affected by modulation, i.e. those having payments cut. Similarly, farms which keep their entire payment because they do not enter any modulation category will be named "not modulated" farms.

to downsize in order to avoid losing payments? Are there indirect impacts on not modulated farms then? It will be now investigated how farm structures develop in the course of the two simulation experiments. Table 5 displays snapshots on the agricultural structure of OPR in three different years to help grasping short, medium and long term impacts of modulation on farm structures.

Table 5. Development of modulated farm groups as regards occupation of land

Scenario		**SFP mod**				**SFP**			
Group		**0**	**1**	**2**	**3**	**0**	**1**	**2**	**3**
% of total UAA	**2008**	22.3	25.6	20.4	31.7	21.7	25.7	19.5	33.1
	2013	21.4	26.2	21.0	31.4	19.5	27.4	19.1	34.0
	2018	19.0	27.0	22.2	31.7	15.3	28.5	6.3	49.9
Number of farms	**2008**	423	65	23	16	422	66	22	17
	2013	387	65	23	16	379	71	21	18
	2018	282	65	23	16	266	74	7	33
Average farm size (ha)	**2008**	61	453	1,023	2,278	59	450	1,022	2,243
	2013	64	463	1,045	2,248	59	442	1,044	2,171
	2018	76	470	1,092	2,244	65	436	1,018	1,715

Source: own calculations.

First, as regards the development of the number of farms in the scenario SPF mod, the number of modulated farms in Groups 1, 2 or 3 does not change at all. Exactly the same farms are to be found in these three groups during the whole simulation, none of them close down in the case of modulation. Then modulation does not constitute a danger for the survival of those modulated farms in these experiments.

Second, the occupation of land from the largest farms belonging to Group 3 in the SFP scenario without modulation reaches almost 50% of the whole area in 2018. In SFP mod this proportion is of less than 32%, although farms are much bigger in average than without modulation. Actually modulation limits the expansion of Group 2 farms which would have switched to Group 3 without it. Hence modulation does not lead to downsizing but to a prevention of further growth of larger farms.

Modulation impacts the land occupation of non modulated farms (Group 0) as well. As shown in Table 4, farm sizes vary between 19 and 260 hectares in this farm group right in the year of the policy reform. If one looks at the last part of Table 5, it is to note that average farm size in this group increases in the case of modulation to the contrary to the case where modulation is not implemented. What is it due to?

A first explanation is directly due to the nature of modulation itself. After the introduction of modulation, modulated farms can only make lower bids for additional land compared to not modulated farms because they will receive less payment for this additional land. For example, consider a farm belonging to Group 2. It knows that if it rents a new plot, it will only get 75% of its entitled payment (modulation of 25% in Group 2 farms).This farm’s shadow price for land is thus lower than the one of farms not affected by modulation. Hence, modulated farms have a worse bidding position on the land market than farms not affected by modulation. Thus, all other things being equal, higher modulation rates may change the power relationships on the land market.

Consequently, farms which do not undergo modulation may benefit from a relative advantage compared to highly modulated farms. An interesting phenomenon to illustrate this occurs by farms lying right under the point of modulation, in other words farms receiving not very much less than 100,000 Euros before modulation. Table 6 below reports the development of farms belonging to this class mixing modulated and not modulated farms in the two scenarios SFP and SFP mod (farms between 201 and 315 ha).

Table 6. Development of farms at the threshold of the first level of modulation

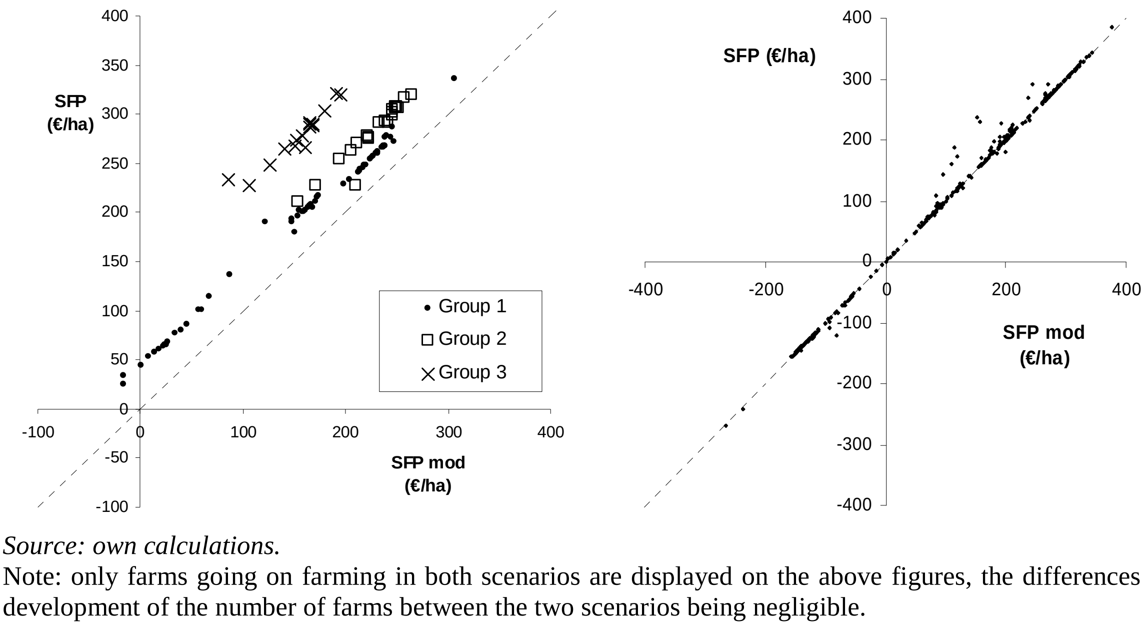
Scenario		SFP mod		SFP	
Group		**0**	**1**	**0**	**1**
Number of farms	**2008**	31	33	30	34
	2013	31	33	25	39
	2018	32	33	21	43
Average farm size (ha)	**2008**	225	270	215	269
	2013	234	284	218	277
	2018	237	290	222	284
Average direct payment (€)	**2008**	88,388	99,952	85,991	110,587
	2013	90,830	103,493	86,130	112,082
	2018	91,910	105,707	87,602	114,629

Source: own calculations.

Note: in scenario SFP mod, the average direct payment for Group 1 is calculated after modulation.

In the SFP scenario, there is no brake to the expansion of farms and those having the financial possibility and interest to rent new plots do it, switching then (but without undergoing any decrease in their direct payment in this scenario) to Group 1, which would have received 10% less payment in case of modulation. When modulation is introduced, as displayed in the SFP mod scenario, it keeps the number of farms in Groups 0 and 1 constant through the years. Knowing they lose 10% of support if they pass the 100,000 Euros bound, farms “at the threshold” of modulation expand their size, but just enough not to pass the modulation point.
How does the introduction of modulation impact the development of profits in the region? Figure 4 displays the change in profits for each farm depending on its modulation group in the case of modulation (scenario SFP, y-axis) or not (scenario SFP mod, x-axis). If the profit of a farm increases with modulation, the corresponding dot will be placed under the dotted bisecting line. Only profits of those farms which have not closed down in both scenarios are considered here. As direct payments are included in the calculation of profits, the left side of Figure 4 reflects the loss of income for modulated farms induced by modulation.

Figure 4. Variation of profits (without costs for unpaid labour) per hectare of UAA for farms in 2013 for modulated farms (left) and non modulated farms (right)



Source: own calculations.

Note: only farms going on farming in both scenarios are displayed on the above figures, the differences in the development of the number of farms between the two scenarios being negligible.

However, this figure has not evolved much since 2008, meaning that modulation, the rules of which are known by all farms when it is introduced, is not a destabilizing factor for the maintenance of farm profits. This explains the stable pattern of farms in the SFP mod case in Table 5. The right part of the figure concerns farms belonging to Group 0, i.e. farms not directly affected by modulation. Generally, the introduction of modulation does not make any difference as regards their profits per hectare for most of them. However, quite a lot of them, although not modulated, see their profits per hectare decrease with the introduction of modulation. The explanation lies in the fact that these farms grow in the SFP mod scenario. For new rented land, rental prices are increasing due to capitalization of payments as shown by WEERSINK (1999) and BERTELSMEIER (2004). Thus, the increasing rental prices reduce the profits per hectare of growing farms, even though they did not undergo any modulation.

The two experiments showed that modulation has a rather low impact at the regional level as regards production patterns and the change in the number of farms in OPR. However, at the individual level, modulation leads farms to modify their decisions. In the next section, first pillar credits from modulation are distributed to the second pillar measure modelled. One objective is to see whether the transfer of modulated payments into the AEM impedes the strong decline in livestock production and encourages farmers to do more than keep grassland in GAEC as was observed before. Do modulated farms benefit this transfer as well?

4.3. Reallocate modulated first pillar payment to the benefit of the second pillar: are there any corrective effects?

The redistribution of first pillar payments to the second pillar is modelled by setting the AEP at a higher level from the year of decoupling in 2005. Three levels of AEP are compared, first in the light of public expenses. As the financial discipline has been agreed among EU Member States (EU Commission 2003), the issue of keeping expenses under past levels is of utmost importance. After decoupling and modulation, the uptake of the AEM (and consequently, the amount of AEP to distribute) by farms constitutes an uncertainty factor in public expenses in these simulations.

The first level of AEP is set to 274 Euros/ha. The payment results from adding the regional total of modulated first pillar payments in 2005 to the total amount of AEP distributed right before the introduction of decoupling in 2004. This is to mimic the redistribution of modulated payments without having the risk of exceeding the amount of public money available in 2004 before decoupling, modulation and reallocation of modulated payments to the AEM.

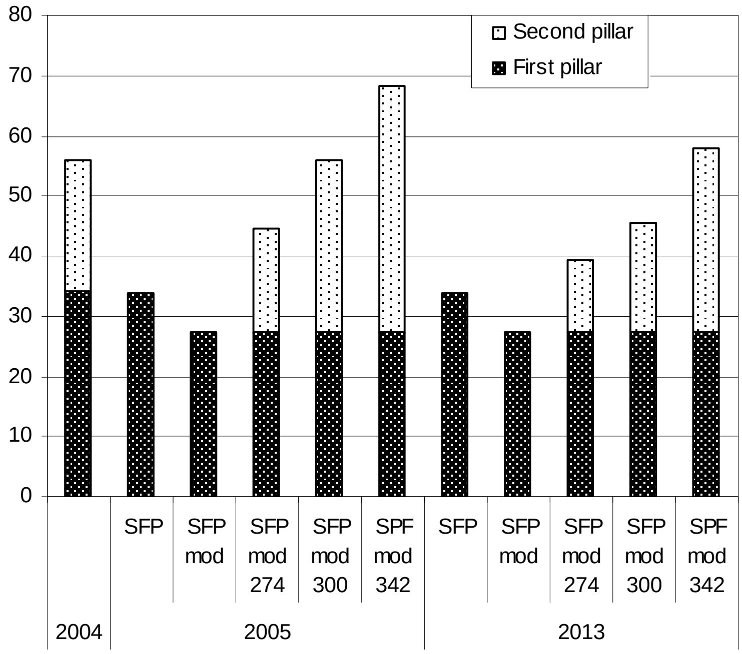
The second level is set to 342 Euros/ha. There, the regional sum of modulated first pillar payments in 2005 has been divided by the total area of grasslands in OPR. It was then simply summed up to the already existing payment of 130 Euros/ha. One can consider this like a simple transfer of payments from the first to the second pillar without any other consideration.

The third level of 300 Euros/ha has been chosen a posteriori. Above this level, public support available before decoupling in 2005 would have been exceeded after the introduction of the policy change.

These three scenarios are named “SFP mod 274”, “SFP mod 300” and “SFP mod 342”, respectively. How did public expenses develop for each level of AEP modelled?

Figure 5 illustrates the distribution of public support between the two pillars of CAP for the scenarios SFP, SFP mod and the three redistribution scenarios SFP mod 274, SFP mod 300 and SFP mod 342.

Figure 5. Total actual payments to agriculture distinguished by first and second pillar in 2004, 2005 and 2013 per scenario (in millions Euros)



Source: own calculations.

First, the amount of first pillar payments removed with modulation is equal to the difference observed in 2005 between SFP and SPF mod. This equals 19,6% of first pillar expenses. As already mentioned in section 4.2, no farm participates in the AEM neither in SFP, nor in SFP mod, therefore second pillar expenses do not exist in these scenarios. What the three redistribution scenarios show is that there is a correlation between the level of AEP and the incentive to participate in the AEM. In 2013, 32% of all farms participate in the AEM in SFP mod 274; this proportion is of 36% and 41% in SFP mod 300 and SFP mod 342, respectively. As regards the proportion of grassland used extensively in the framework of the AEM, it constitutes more than one third of all grasslands of the region in SFP mod 342, while in SFP mod 274 and SFP mod 300 this proportion reaches 19% and 29%, respectively.

Looking at expenses induced by the scenario SFP mod 342 illustrates well what would have happened if only a transfer from the first to the second pillar had occurred. In 2005, expenses in SFP mod 342 are 123% of those before decoupling. It is due to a higher number of farms participating in the programme and therefore more hectares of AEP grassland to grant at a quite high level. As regards results in SFP mod 274, expenses have not been exceeded after decoupling, modulation and transfer to the second pillar. There would even have been some room for modulated money to be transferred in the AEP. This room is fully used in SFP mod 300. This intermediate level of 300 Euros/ha of AEP grassland seems to be the most relevant level in these experiments if 1) maximising the area of AEP grasslands in the region and, 2) distributing the more available money possible to the second pillar, would have been parallel goals to the limitation of public expenses. Therefore the scenario SFP mod 300 will be used for further analysis.

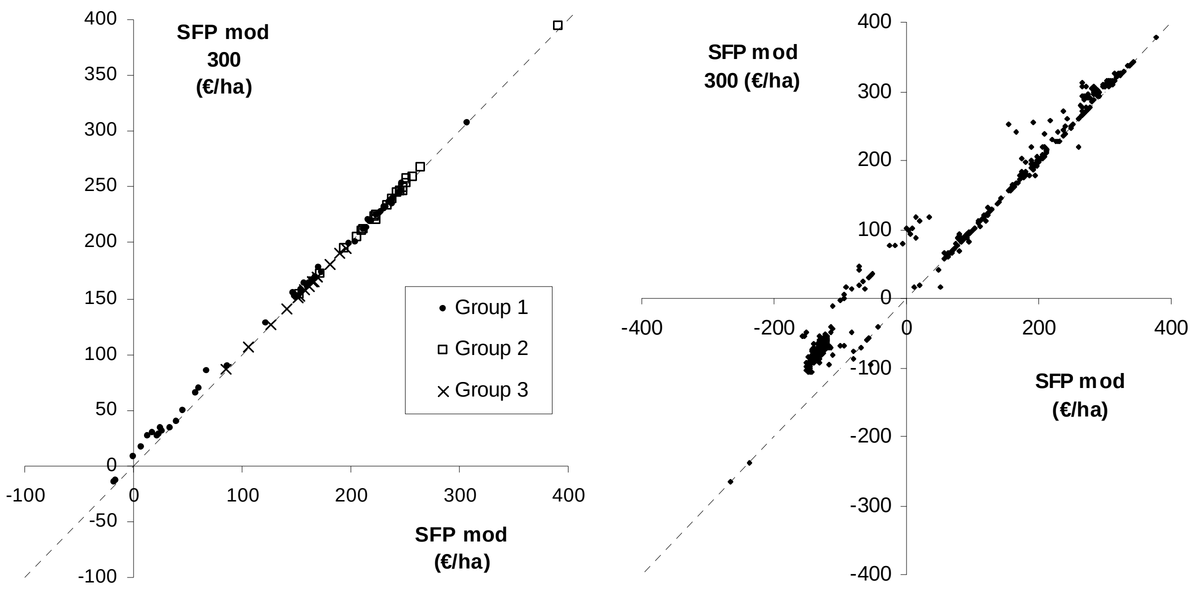
Impacts on production patterns are visible at the regional level as well. The production of beef cattle, which development is closely linked to grassland activities, does not decrease as abruptly in the SFP mod 300 scenario than in SFP mod scenario. In 2013, 51% of beef cattle herds are still present if the AEP is set to 300 Euros (less than 1% in SFP mod). Similarly, the production of suckler cows in SFP mod 300 stays at 41% of its initial level whereas in SFP mod, this production has almost completely disappeared. Then, the production of ruminants in

SFP mod 300 is based on AEP grassland. It is however performed by smaller farms present in the region. If the level of AEP is not economically viable, farms are keen to abandon these productions under decoupling conditions modelled here and rather keep on maintaining grassland under GAEC.

In Figure 6, the same graphs than in section 4.2 are displayed, but in this case, the scenario SFP mod (x-axis) is compared to the scenario SFP mod 300 (y-axis). The only difference between both scenarios is actually the level of AEP distributed for each hectare of AEP grassland.

For farms belonging to Groups 2 and 3, this hardly makes a difference. Actually, as a big majority of these farms are far from having 30% of grassland in their UAA, they have no chance to eventually participate in the AEM. Then they behave the same way in both scenarios whatever the level of the AEP. In Group 1, the increase in AEP constitutes an incentive for some farms having at least 30% of grassland in their UAA to participate in the programme, which means that they will get the additional support provided by the AEP. Consequently, their profits per hectare increase a bit in SFP mod 300 in comparison to what they could have expected in SFP mod.

Figure 6. Variation of profits (without costs for unpaid labour) per hectare of UAA for farms in the case of two different levels of AEP in 2013 for modulated farms (left) and not modulated farms (right)



Source: own calculations.

Note: only farms going on farming in both scenarios are displayed on the above figures.

In the case of not modulated farms (on the right side of Figure 6), the benefit is twofold. First, many of these farms have rather a lot of grassland in their UAA, they can use it as AEP grassland instead of only keeping it in GAEC, and get more money for this. But second, this increase in AEP also slows the exiting of farms to their benefit. In 2013, while 84% of farms present at the beginning of the simulation are still farming in the SFP mod scenario. This proportion is 88% in the SFP mod 300 scenario. In 2018, it is 66% and 82%, respectively. Smaller farms were the firsts quitting farming in SFP mod: they are able to stay longer in the game in SFP mod 300.

5. Conclusion

The central point of this study was related to impacts of modulation as recently evoked by the EU Commission in one of the regions where some farms are large enough to be affected. The experiments showed that modulation would have impacts on farm structures, but not only on modulated farms. Through the decrease in direct payments because of modulation, expected profits per hectare would decrease for modulated farms as well. Therefore, these farms may have less success on land markets to the benefit of smaller not modulated farms. The method used has shown its advantage here by considering interaction between farms on the land market. Parallel to this, the higher the AEP distributed per hectare of grassland in the framework of the second pillar AEM "Extensive grassland", the more attractive it is for farmers who own or rent enough grassland to participate in this programme. Able to grasp heterogeneities in sizes, production systems, etc. between farms, the method has helped to capture the main features of such an optional programme, which regional success can only result from individual decisions. Another point is that land kept in GAEC is directly competing with AEP under decoupling conditions. So a careful policy conclusion may be that if society demands the active, but extensive use of grasslands in conjunction with livestock production, then it appears to be better (under the made assumptions) to increase specific AEP payments. The uptake of AEM is however more insecure and depends on the relative profitability of grassland related ruminants. As no variation in livestock prices have been introduced, results have to be considered carefully in this matter.

The angle of public expenses has been chosen in this study. Experiments have shown the necessity of a careful monitoring of monetary transfers to the second pillar, especially as, from the EU Member States sight, second pillar measures are co-financed. One could mention the example of the "farm territorial contracts" (CTE)[9] in France implemented from 2001 (Ministère de l'Agriculture et de la Pêche 2002). The high expenses they provoked due to the absence of public regulation forced the creation of a substitute in emergency with the "contracts for sustainable agriculture" (CAD), which expenses were locally controlled in advance. In this study, the success of the AEM modelled strongly depended on the structure of the region itself. Without enough grassland expected to be used extensively, the AEM would have been of no use. This may reveal the importance of the subsidiarity property of CAP. From the whole panel of possible AEM, some have proved their efficiency at the local level. If there should be a redistribution of first pillar payments coming from modulation to the second pillar, taking local or regional knowledge into consideration should help a better monitoring.

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[9] These contracts (Contrats Territoriaux d'Exploitation) were five years contracts between the State and the farmer. They aimed at conciliating economical profitability with the maintenance of jobs, food quality and protection of the environment. Both because of 1) their tremendous success in terms of number of contracts signed and average support per contract and of 2) their relative inefficiency in terms of environmental goals, they have been replaced in emergency in 2003 by the "Contrats d'Agriculture Durable" (CAD), which expenses were fixed from the beginning of their introduction.

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