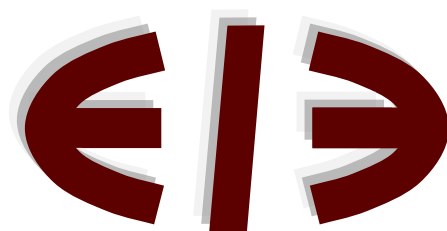


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# The Impact of the 2013 CAP Reform on Land Capitalization<sup>1</sup>

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## Abstract

Decoupled direct payments were introduced in the EU in form of the Single Payment Scheme (SPS) in 2005. The 2013 CAP reform changed both the implementation of the SPS and its budget. We assess the possible effects of the 2013 CAP reform on EU land markets; in particular the capitalization of the SPS in land rental values. Our analyses suggest that the implementation details of the 2013 CAP reform will largely determine the impact of the SPS on land markets. The key ones are the reference period for entitlement allocation, regionalization, payment differentiation and budgetary changes. Our analysis also implies that a number of relatively minor policy changes could have substantial impacts on land markets.

**Key words:** Capitalization, decoupled subsidies, CAP reform, land market, land prices.

**JEL:** H22, L11, Q11, Q12, Q15, Q18, P32, R12.

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# The Impact of the 2013 CAP Reform on Land Capitalization

## Introduction

Annually, the European Union (EU) spends around 55 billion euro on the Common Agricultural Policy (CAP) with the aim of supporting farmers' income and the production of public goods, such as landscape and clean environment (European Commission 2013). The majority of CAP subsidies are disbursed in form of decoupled direct payments the so-called Single Payment Scheme (SPS). Under the SPS farms receive annual payments which do not depend on the current or future quantities of agricultural production but are linked to farmland. The SPS was introduced by the 2003 CAP reform. In 2013 the SPS underwent substantial reform changing both the SPS implementation and its payment level (EU 2013).

The objective of this study is to analyze how the 2013 CAP reform may affect the SPS capitalization into land values. We analyze how different elements of by the CAP reform may alter capitalization relative to the pre-reform period. The reform included a shift from historical to regional SPS, a reduction of SPS to large farms, differentiation in per hectare payments, 'CAP greening', changes in the reference period for entitlement allocation, and the definition of farm eligibility for the SPS.

The capitalization of agricultural subsidies has been studied extensively in the literature. Previous studies have analyzed how these effects differ among policies (Alston and James 2002; de Gorter and Meilke 1989; Dewbre, Anton, and Thompson 2001; Gardner 1983; Guyomard, Mouel, and Gohin 2004), how the results change if one includes accounts for agents along the vertical chain (Desquilbet and Guyomard, 2002; Sheldon, Pick, and McCorrison 2001), imperfect competition (McCorrison and Sheldon 1991; Salhofer and Schmid 2004), imperfections in factor markets (Ciaian and Swinnen 2006; 2009), or transaction costs and constraints in the implementation of the policies (OECD 2007; de Gorter 1992; Vatn 2001).

Early studies focused on policies which were coupled to production decisions, e.g. the price intervention or production quotas. After the decoupling of policy support in the late 1990s in the US and 2003 in the EU, more recent studies have analyzed the impact of decoupled subsidies (e.g. Chau and de Gorter 2005; de Gorter 2007; Goodwin and Mishra 2006; Hennessy 1998; Serra et al. 2005; Sckokai and Moro 2006).<sup>1</sup> Studies which have analyzed the SPS include Ciaian, Kancs, and Swinnen (2008), Courleux et al. (2008), Kilian and Salhofer (2008) and Gocht et al. (2013).

These studies show that the SPS capitalization largely depends on the ratio of eligible area to the total number of entitlements. If the allocated entitlements are in deficit relative to the eligible area of land, then the SPS benefits farms, i.e. it is not capitalized into land values. However, if the allocated

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<sup>1</sup> The empirical literature estimates the capitalization rate of decoupled subsidies between 6% and 90% of the value of the payment (Barnard et al. 1997; Goodwin, Mishra, and Ortalo-Magné 2003, 2005; Lence and Mishra 2003; Roberts, Kirwan and Hopkins 2003; Patton et al. 2008; Kirwan 2009; Breustedt and Habermann 2011; Ciaian and Kancs 2012; Johansson and Nilsson 2012; Kilian et al. 2012; Guastella et al. 2013; Van Herck, Swinnen, and Vranken 2013; Michalek, Ciaian, and Kancs 2014).

entitlements are in surplus, then the SPS gets capitalized into land values and thus benefits landowners. Ciaian, Kanacs, and Swinnen (2010) also show that the SPS capitalization depends on differences in per hectare payment between farms: the larger is the SPS differentiation between farms, the smaller will be the SPS capitalization. SPS capitalization is also affected by cross-compliance. Cross-compliance imposes additional costs to land use which causes a reduction of SPS capitalization (European Commission 2007b; Ridier, Kephaliacos, and Carpy-Goulard 2008).

The SPS capitalization has important policy implications for the EU. There are also likely important differences among EU member states because of differences in land markets and land regulations in the EU (Swinnen and Knops 2013). For example, on average 53% of farmland is rented in the EU-27, but there is wide variation. MS with a high share of rented land (more than 70%) include Slovakia, Bulgaria, the Czech Republic, France, Belgium, Malta and Germany. MS with a low share of rented land (less than 30%) include Denmark, Ireland, Poland, Portugal. These variations also affect the extent to which farmers or non-farming landowners capture the gains if SPS is capitalized. While there is some farm-to-farm land renting in the EU, most of the rented out land is owned by non-farming landowners.

The article is organized as follows. The second section introduces the SPS and the 2013 CAP reform. The third section summarizes the main finding from theoretical literature on the SPS capitalization, and outlines the land market model used in the theoretical analysis. The fourth section analyses separately the impact of each element of the 2013 CAP reform on the SPS capitalization. The fifth section provides an overview of the combined effects of the 2013 CAP reform. The final section concludes.

## **Single Payment Scheme in the EU**

### ***Introduction of the SPS (2003)***

The SPS was introduced by the 2003 CAP reform and replaced coupled subsidies. Each farm was allocated an amount of SPS entitlements. Farms can receive SPS payments if they have both entitlements and an equal amount of eligible land. The SPS payments are linked to land because, in the absence of land, farms cannot activate (cash in) the SPS entitlements. However, the SPS is not linked to a specific land area – the SPS entitlements can be activated by any eligible farmland in the region. Farms can expand or decrease their stock of entitlements by buying or selling entitlements on the market from other farms.<sup>2</sup>

When implementing the SPS, MS could choose between three different SPS implementation models: the *historical* model, the *regional* model, and the *hybrid* model. Under the historical model, the SPS is farm-specific and equals the support the farm has received in the “reference” period, i.e. when coupled subsidies were given. Under the regional model, an equal per hectare payment is granted to all farms in a given region. The hybrid model is a combination of historical and regional models. The key difference between the three models is in the unit value of entitlements: under the historical and hybrid models, the value of entitlement varies between farms (stronger in the former than in the latter), whereas under the regional SPS model, all farms in a region have entitlements with

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<sup>2</sup> Note that entitlement trade is allowed only within MS, not between them implying that a given entitlement can be activated only on the land in a given MS.

the same unit value.

The most commonly implemented SPS model in the EU is the historical model (Table 1). It is used in Austria, Belgium, France, Greece, Ireland, Italy, Netherlands, Portugal, Spain, and Wales and Scotland (UK). Malta and Slovenia implement regional model. Denmark, Finland, Germany, Luxemburg, Sweden and England and Northern Ireland (UK) use the hybrid model.

Table 2 reports the number of activated entitlements relative to the utilized agricultural area (UAA) for 17 MS in 2010. The figures suggest structural differences between MS. In about half of the MS reported in the table, activated entitlements roughly correspond to the UAA (e.g. Greece, Ireland, Denmark, Germany, Finland, Sweden), whereas in other MS the ratio of activated entitlements to UAA is significantly below one (e.g. Spain, Italy, Malta, France, Portugal).

Farm eligibility for the SPS is subject to cross-compliance. Each farm that receives the SPS must comply with the Statutory Management Requirements (SMR), and maintain land in Good Agricultural and Environmental Condition. The SMR are based on EU regulations in the fields of environment, public, animal and plant health, and animal welfare.

### ***Pressures for SPS reform***

The SPS is the main support instrument within the CAP and consumes a large share of the CAP budget. Not surprisingly, it represented a central element of the 2013 CAP reform discussions. There were several pressures for reform. These included pressure to reduce public spending on SPS for budgetary reasons, pressures to change the implementation models to improve the SPS impacts on the environment (and other public externalities), and pressures to change the distribution of the SPS benefits both among farms, among regions, and among MS.

A crucial element was the pressure from Ministers of Finance to reduce SPS spending in times of a financial and economic crisis and overall budgetary constraints. This pressure was present throughout the negotiations as the agreement on the future EU Budget was going on in parallel with the CAP reform discussions.

In response to these pressures, there was a clear attempt from those in favor of SPS (and general CAP) spending to change the implementation of the SPS in order to provide a better justification for SPS from the perspective of EU's general welfare – similar to “legitimacy strategy” used by Fischler in the 2003 CAP Reform (see Swinnen 2008). For this reason, there was much discussion on the SPS impact on public good provisions such as landscape quality, biodiversity and water quality. Farm eligibility for the SPS was already subject to fulfilling certain environmental and public good related criteria, under the so-called “cross-compliance” regulations. Many (such as environmental groups) argued that these regulations needed to be tightened and better enforced in order be (more) effective in ensuring environmental and public good benefits (Bureau 2013).

Another set of pressures were caused by differences in SPS benefits among farms and regions (within MS), and there was a demand for “harmonization” of payment levels within MS. Much of these differences had to do with the choice of SPS models among MS (and regions within MS). In MS that implement the historical and hybrid SPS models, the payment per hectares can vary strongly across farms, depending on the coupled payments they received in the reference period.<sup>3</sup>

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<sup>3</sup> See Ciaian, Kancs, and Swinnen (2010) for a discussion of the political economy factors behind the choice of the SPS

However, after the move to the decoupled SPS system, there were strong pressures to harmonize the payment as the arguments to support differences in payments between farms located in the same region became increasingly hard to defend.

A final set of pressures were caused by differences in SPS benefits across MS, which lead to demands for harmonization of payment levels across MS. Much of this was an East-West divide. In the “new” MS (countries in Central and Eastern Europe which joined the EU in 2004 and 2007) the payments per hectare are lower than in most “old” MS (the co-called EU-15). There are two reasons for this difference. The “economic” justification is that SPS were linked to previous farm productivity levels. As the new MS were on average less productive, farmers received lower subsidies in these countries. However, there was also a political element. The Central and Eastern European countries were not present at the negotiation table when the SPS subsidies (and their criteria) were decided since they joined the EU only afterwards. At the time of accession the offer they received was part of the accession negotiation and their payment levels were partially determined by the EU (CAP) budget constraints, resulting in lower payments. Two things changed over the past decade: their productivity increased and, obviously, they are now part of the decision-making process. Hence, new MS insisted on reducing the payment disparities between old and the new MS.

### ***The 2013 reform***

The 2013 reform will change both the implementation conditions of the SPS and its budget (EU 2013):

- I. The SPS budget for specific MS will change for two reasons: the overall budget will be reduced and there will be a harmonization of payments across MS. The reform will reduce high value SPS, and increase low value SPS.
- II. The reforms imply a shift towards the regional SPS model, which implies a harmonization of the SPS across farms (i.e. towards a flat-rate SPS value) at MS (or regional) level.<sup>4</sup>
- III. Some changes increase differentiation in per hectare SPS payments: certain farm types, such as young farmers and farms located in disadvantaged areas, may receive additional SPS payments; a reduction of the SPS for large farms; a higher SPS value for the first 30 hectares (or up to the average farm size if higher than 30 hectares) than for the rest of area.  
Each of these elements of the reform increase differentiation of per hectare SPS value across and within MS and regions in the EU (and will have thus an opposite effect as the harmonization effect discussed above).
- IV. There are stronger linkages of the SPS to “agricultural practices beneficial to the climate and

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model by MS at the time of the SPS introduction in 2005/2006. The reasons include concerns about the redistribution of subsidies between farms, the costs of implementation, and adjustment costs of the agricultural sector with SPS implementation.

<sup>4</sup> The MS implementing the historical SPS model may harmonize the SPS by choosing from different options: to take a national approach, or a regional approach (based on administrative or agronomic criteria); to achieve a regional/national rate by 2019, or to ensure that those farms getting less than 90% of the regional/national average rate see a gradual increase – with the additional guarantee that every farmer reaches a minimum payment of 60% of the national/regional average by 2019. The amounts available to farmers receiving more than the regional/national average will be adjusted proportionally, with an option for Member States to limit any "losses" to 30% (EU 2013).

environment” (so called 'CAP greening').<sup>5</sup>

- V. The reference period for entitlement allocation: the MS can choose to maintain old entitlements or to allocate new entitlements.
- VI. Farm eligibility for the SPS is restricted: entitlements are only for active farmers and not for non-farming landowners.

## **Insights from the Literature and Conceptual Framework**

### ***Previous studies on the SPS***

Previous studies that investigated, among others, the impact of the SPS on land capitalization (Ciaian and Swinnen 2006; Courleux et al. 2008; Ciaian, Kancs, and Swinnen 2008, 2010; Kilian and Salhofer 2008; Feichtinger and Salhofer 2013; Viaggi et al. 2013) show that the SPS implementation details are important determinants of the land capitalization of SPS. Key findings are:

*The capitalization of the SPS depends strongly on the ratio of the eligible area to the total number of entitlements.* If there are more entitlements (“surplus”) than the eligible area, then the SPS leads to a land price increase (“is capitalized in land prices”). However, if there are less entitlements (“deficit”) than eligible land, then the SPS does not increase land prices (“not capitalized in land values”). The intuition is that the more entitlements are allocated to farms (compared to the eligible land), the more farms will compete for the eligible land to activate the entitlements in order to cash the SPS. The increased demand for land will cause land prices to go up.

*The share of the SPS that is capitalized is higher for small than for large payments.* As farms with high value entitlements compete with farms holding low value entitlements, farms owning high value entitlements can afford to pay higher rents, but will only bid up the rent as far as the low value entitlements. Farms owning low-value entitlements can only use these to compete for land and thus low value entitlements will determine the SPS capitalization at the margin.

*Capitalization of the SPS in land prices will be stronger under the regional SPS model than under the historical SPS model.* With the regional model there is no difference in SPS entitlements among farms, while there may be large differences with the historical model. An implication of the previous point is that the larger the differences between farms in SPS entitlements, the smaller will be the capitalization of the SPS – because the smallest value will determine the level of capitalization. Hence, everything else equal, the SPS capitalization will be larger in the regional model.

*The more difficult it is to trade entitlements, the more the SPS becomes capitalized into land values.* With low tradability, farms are more likely to keep their entitlements (instead of selling them)

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<sup>5</sup> SPS will be supplemented by an additional 'greening' payment taking up to 30% of the SPS funds, if farms respect the 'greening' requirements: crop diversification, maintenance of permanent grassland and ecological focus area (set-aside). Under the crop diversification, the cultivation of the arable land needs to include at least two different crops on farms cultivating between 10 and 30 hectare of arable land and at least three crops on farms with a larger arable area. The main crop should not exceed 75% of arable land, and the two main crops should not exceed 95% of the arable area. Under the maintenance of permanent grassland, farms are required not to convert and to plough permanent grassland. The ecological focus area requires farms larger than 15 hectares to set aside at least 5 % of farms' eligible area (excluding areas under grassland), with the possibility of increasing this percentage to 7% subject to an evaluation review in 2017. The area that qualifies as ecological focus area includes land left fallow, terraces, landscape features, buffer strips, etc. In order to avoid penalizing those farms that already address environmental and sustainability issues, the "Greening equivalency" system is applied whereby the application of environmentally beneficial practices already in place are considered to replace these three basic greening requirements (EU 2013; European Commission 2013).

and to use them to compete for land, which exerts an upward pressure on land prices. In other words, entitlements indirectly become farm specific or practically attached to the farmer's land if trade is constrained. In contrast, facilitation of entitlement trade may actually play a role in reducing potential SPS capitalization as it will reduce pressure of SPS on land markets. In principle full tradability cuts the link between entitlements and a specific land area or a specific farmer thus leading to lower SPS impact on land market. The impact of the tradability on SPS capitalization is more significant in the case of deficit entitlements. With surplus entitlements, the SPS is capitalized anyway so tradability is less important. In this case low tradability also leads to higher SPS capitalization but its effect is rather small.

*Capitalization of the SPS in land prices is higher when the supply of land is less elastic.* In the extreme case, with fixed land supply, the SPS may get fully capitalized in land prices, i.e. all subsidies go to the landowner because the land rent increase is equal to the subsidy per hectare. This result holds only if there are sufficient entitlements.<sup>6</sup>

*Capitalization of the SPS in land prices might be lower with cross-compliance.* Cross-compliance requirements imply additional costs to land users, which reduce the demand for land and thus the (positive) effects of SPS on land rents will be smaller.

*Capitalization of the SPS in land prices is lower when land prices are regulated.* Land market regulations in the EU-27 vary strongly among Member States.<sup>7</sup> Of particular importance for the SPS capitalization are *maximum price regulations*. The potential capitalization of the SPS into land rents will be reduced in the presence of a rental price ceiling as exists, for example, in Belgium, France and the Netherlands. On the other hand, to overcome the rental price regulation (i.e. the maximum price intervention), farmers will have the incentive to pay unofficial payments (bribe) to landowners to prevent the loss of land to competing farms.<sup>8</sup>

*Capitalization of the SPS in land prices is higher when the SPS reduces credit constraints.* Many farms, in particular in the poorer rural regions of the EU, face credit market constraints. Access to cash payments (SPS) may reduce these credit market constraints, either directly by increasing farms' cash flow or indirectly through easier access to bank loans. This will increase capitalization of the SPS, because it increases farm productivity and hence the demand for land.

*(Changes in) capitalization of the SPS in land prices is more gradual with long term rental contracts.* The length of the rental contracts can vary strongly – and, often because of regulations, varies strongly among MS.<sup>9</sup> With short run contracts (as e.g. in Ireland) average rental price adjustments can occur fast; with long term contracts (as e.g. in Belgium and France) average rental price adjustments will occur more slowly.

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<sup>6</sup> In empirical studies, land supply elasticities are usually found to be rather low, mostly owing to natural constraints. For example, based on an extensive literature review, Salhofer (2001) concludes that a plausible range of land supply elasticity for the EU is between 0.1 and 0.4. Similarly, Abler (2001) finds a plausible range between 0.2 and 0.6 for the US, Canada and Mexico.

<sup>7</sup> See Swinnen, Van Herck, and Vranken (2013) for a detailed analysis of land market regulations in EU member states.

<sup>8</sup> Anecdotal evidence suggests that this indeed happens in countries with strong rental price regulations (Ciaian, Kancs, and Swinnen 2010).

<sup>9</sup> According to Ciaian, Kancs, and Swinnen (2010), the key determinants of rental contract durations in the EU are social norms (e.g. in Greece), governmental regulations (e.g. there is a minimum of 9 years in Belgium and France, 6 years in the Netherlands and 5 in Spain), and market institutions (e.g. Germany, Italy, Sweden). Moreover, in several countries (e.g. France) even the renewal of rental contracts is regulated.



## ***Conceptual framework***

To analyse the potential impacts of the CAP reform we use a stylised conceptual framework. The main reason for choosing this approach is that data on the effects of the proposed new CAP instruments are not available and thus standard empirical analyses are not possible. The conceptual framework used in this paper is based on Ciaian, Kancs, and Swinnen (2008), Courleux et al. (2008) and Kilian and Salhofer (2008).

Following these studies, we assume that: (i) output and variable input equilibrium prices are exogenous; (ii) the possibility for an increase or decrease in the total land use, i.e. upward sloping land supply; (iii) the entire land is owned by “landowners”, who rent the land to “farms”; (iv) there are two regions, which are equal in all respects except for the land supply; (v) there are two types of entitlements; (vi) entitlements are allocated to farms (this assumption is relaxed later);<sup>10</sup> and (vii) entitlements are fully tradable within regions, but non-tradable between regions.<sup>11</sup>

The land market is illustrated in Figure 1. The horizontal axis shows the quantity of land,  $A$ , the vertical axis measures the rental price,  $r$ , and the SPS payment,  $t$ . The aggregate land demand without SPS is given by the downward sloping curve  $DD$ . Land supply in region 1 is given by curve  $S_1$ , and land supply in region 2 is given by curve  $S_2$ . The land market equilibriums in the zero support regime, are  $(A_1^*, r_1^*)$  and  $(A_2^*, r_2^*)$  in region 1 and region 2, respectively. Although, the productivity is the same for all farms (i.e. land demand is the same in region 1 and region 2), there is less land used in equilibrium in region 1 than in region 2 due to lower land supply.

We consider two types of entitlements. The stock of type 1 entitlements,  $A_E^1$ , has unit face value  $t^1$ , and the stock of type 2 entitlements,  $A_E^2$ , has face value  $t^2$ . The aggregate stock of entitlements,  $A_E^T$ , is the sum of the two types, i.e.  $A_E^1 + A_E^2 = A_E^T$ . In the regional model both types of entitlements have equal face value,  $t^r = t^1 = t^2$ . In the hybrid and historical models the face value of entitlements differs,  $t^1 \neq t^2$ .

## **Capitalization effects of the 2013 CAP reform**

### ***Changes in the SPS budget (Reform I)***

There will be a decline in the EU budget for the SPS and, within the reduced overall budget, a reallocation of the SPS budget between MS. This means that (a) in MS with a high SPS value per hectare the total SPS budget will decline, and (b) in the MS with a low SPS value per hectare the total SPS budget may increase or decrease depending on which effect (overall budget decline versus reallocation) will dominate. Overall, the budget change will have a differentiated impact across MS,

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<sup>10</sup> Such a conceptual framework is useful to analyze and understand the capitalization effects, but one should carefully interpret the results in the context of income distributional effects. Many farms in the EU own (at least part) of the land they operate. Hence, they are both “landowner” and “farm”, but this differs strongly between farms and member states (and regions within member states). In addition, while we do not explicitly model land sales, the results of our analysis are relevant for land sales markets under plausible conditions. The results of this model can be extended to land sales markets if the sale price of land is assumed to be adequately approximated by the sum of discounted future rental prices. Kilian and Salhofer (2008) show that under these conditions, the rental price changes derived in the paper are equivalent to sale price changes.

<sup>11</sup> This latter assumption implies that entitlement ownership does not matter with respect to which farms own them within the region; they will always end up with farms with highest willingness to pay for them in that region (for more details on entitlement tradability see Ciaian, Kancs, and Swinnen 2008).

depending on whether the country will receive more or less from the SPS and weather entitlements are in deficit or in surplus.

As a starting point, we consider the flat-rate entitlements  $t^r$  in the pre-reform period. This is illustrated in Figure 1. If the total amount of entitlement is  $A_E^T$  (and entitlements can be traded) then the bold line  $D_rD$  represents the (kinked) demand curve with SPS with the distance between both functions determined by the level of SPS ( $= t^r$  in the figure). Given that farms need land to activate their entitlements and cash-in the SPS, farms' willingness to pay for land increases by the value of entitlement,  $t^r$ . This holds until all entitlements are exhausted, i.e. up to  $A_E^T$ . After this point, land demand is the same with and without the SPS, as there are no unused entitlements available. The equilibriums with  $t^r$  in the pre-reform period are  $(A_{1r}, r_{1r})$  and  $(A_2^*, r_2^*)$  in region 1 and region 2, respectively.

As is obvious from Figure 1, the effects of CAP reform on the land market are very different in the two regions. In region 1, where there is a shortage of land compared to the amount of entitlements ( $A_1^* < A_E^T$ ), the equilibrium changes. Consider the SPS budget increase which extends the entitlement value from  $t^r$  to  $t^{rh}$ , where  $t^{rh} > t^r$ . The impact on land markets is reflected in an upward shift of land demand from  $D_rD$  to  $D_{rh}D$ . The land market equilibrium shifts from  $(A_{1r}, r_{1r})$  to  $(A_{1rh}, r_{1rh})$ . Land use and land rent increase by  $A_{1rh}^* - A_{1r}^*$  and by  $r_{1rh}^* - r_{1r}^*$ , respectively.<sup>12</sup> Competition for land will drive up land rental prices. However, in region 2, where there is more land available than there are entitlements ( $A_2^* > A_E^T$ ), there is no impact on the land market. The equilibrium remains at  $(A_2^*, r_2^*)$ . Land rents do not change, nor does land use. The SPS payments fully increase farm incomes. The SPS has a zero-distortive marginal effect on farm rental decisions in this region.

Reductions in the level of SPS will have opposite effects as the increase of SPS. The level of  $t^r$  will decline and this may change land rents and land allocation, or not, depending on the ratio of entitlements to land rents. Consider a reduction of SPS from  $t^r$  to  $t^{rl}$ , where  $t^{rl} < t^r$ . Land demand shifts downward from  $D_rD$  to  $D_{rl}D$ . In region 1, land market equilibrium shifts to  $(A_{1rl}, r_{1rl})$ , land use reduces (by  $A_{1r}^* - A_{1rl}^*$ ) and cause a fall in land rents (by  $r_{1r}^* - r_{1rl}^*$ ). In region 2, the reduction in SPS has no effect on the land market.

### ***Harmonization of the SPS across farms (Reform II)***

The harmonization of SPS within a country/region, when the historical model is replaced by a regional model for SPS entitlement allocation, is likely to increase land rents (thus increase capitalization of SPS in land prices). The reason is that the land rents (and capitalization of SPS) are determined at the margin and demand for land will go up at the margin with harmonization of the payments.

This is illustrated in Figure 2, which is extension of Figure 1. In Figure 1 we have the situation of a regional model when all farms get the same SPS. In Figure 2 we introduce heterogeneity among farms in their entitlements – as the historic model does. Consider that there are two types of

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<sup>12</sup> Note that we do not exclude the possibility that the marginal land used to activate entitlements might be left uncultivated. The choice between using land in production versus leaving it uncultivated depends on the costs to keep it in good agricultural conditions required by the SPS eligibility (i.e. cross-compliance) relative to the costs of using it in production. Implicitly we assume that these costs are equal in our figures. For more detailed analysis on this issue see Courleux et al. (2008) and Kilian and Salhofer (2008).

entitlements: high value SPS entitlements  $t^1$  and low value SPS entitlements  $t^2$ . With tradability of entitlements, farms will first use the high-value entitlements, and then the low value entitlements.<sup>13</sup> This implies a land demand function such as represented by the (double kinked) curve  $D_h D$ . Relative to a no-support regime, the SPS shifts land demand by  $t^1$  up to  $A_E^1$ , where all high value entitlements are activated. In the interval from  $A_E^1$  to  $A_E^T$  (where  $A_E^T - A_E^1 = A_E^2$ ) it is higher by  $t^2$ , and it is the same after all entitlements are activated at  $A_E^T (= A_E^1 + A_E^2)$ .<sup>14</sup>

To compare the effects of the different models, we keep the total amount (value) of SPS entitlements constant. In previous sections we have shown that under the regional model, the equilibrium was  $(A_{1r}^*, r_{1r}^*)$  in region 1 – where the land was binding and which is the interesting case. Under the historical model the equilibrium in region 1 is  $(A_{1h}^*, r_{1h}^*)$ . Hence, land use will increase and land rents will go up with the shift from the historical to the regional model.

In region 2, there is no effect of the harmonization. The SPS had no impact on the land market – this remains the same under the historical model:  $(A_2^*, r_2^*)$  remains the equilibrium in region 2. Hence harmonization of payments will not affect the land market in this situation.

Regional models could increase the degree of the SPS capitalization also because it adds transparency to the land market. All entitlements have the same value within a region which could be observed by all market participants at zero costs. In contrast, with historical/hybrid model the exact value of entitlements that farmers own may not be known by landowners which may reduce their bargaining position with respect to farmers. This asymmetric information on entitlement values may reduce the capitalization in the historical model relative to the regional one.

These results are in line with findings of the Impact Assessment for the post-2013 CAP of the European Commission (2011b) which acknowledges that the different models for implementing the SPS have an effect on the degree to which payments were capitalized into land values. It states that “the move to a regional model throughout the EU is likely to increase the rate of capitalization of support in land prices as compared to the historic model” (European Commission 2011b).

### ***Differentiation of the SPS between farms (Reform III)***

As explained in Section 2.3, the reform also includes several changes in the SPS, which may increase the differentiation in per hectare SPS, such as additional payments to young farmers, disadvantaged areas and the SPS which are lower beyond a certain farm size, etc. (see Reform III in section 2.3). Each of these reform elements effectively increases differentiation of per hectare SPS value.

The impact of these reforms can be analyzed in the framework we used to compare the historical and regional models – as illustrated by Figure 2. For a given (fixed) total amount (value) of the SPS, an increased differentiation will have a similar effect, as going from the regional to the historic model. By differentiating SPS per hectare one adds “kinks” to the land demand function. The

<sup>13</sup> Full tradability of entitlements implies that we can disentangle the entitlements from specific hectare of land or specific entitlement holder. Tradability of entitlements leads to a situation where first most valuable entitlements are exploited and are activated by farms with the highest willingness to pay for land renting and then less valuable ones are exploited (Ciaian, Kancs, and Swinnen 2008, Courleux et al. 2008 and Kilian and Salhofer 2008).

<sup>14</sup> Note that most MS implementing historical model have entitlements with a continuum of face values. See Killian et al. (2012) for modelling of this situation. Our assumption of two entitlements is to simplify the exposition of the effects and it does not affect the general results.

result is that at the margin the demand will be lower than in the case of more harmonized payments. Hence, these reforms will likely reduce land rental prices and capitalization.

Obviously this will be the case only in region 1 with surplus entitlements, where the SPS affects land markets.<sup>15</sup> In region 2 with deficit entitlements, the capitalization effects (where farms absorb the entire SPS) are the same in both cases; with and without Reform III.

### **'Greening' of the CAP (Reform IV)**

The reformed CAP will impose a stronger linkage of the SPS to “agricultural practices beneficial to the climate and environment” (so called '*CAP greening*'). The conditions are similar to cross compliance but most likely more demanding than current cross-compliance requirements.<sup>16</sup> Not respecting these requirements may lead to a reduction or a full loss of the SPS. Conceptually, the CAP 'greening' has similar implications for land markets as cross-compliance. The effect of greening on the land market is likely to be a decline in land rents. An increase in requirements will increase the costs for farmers, thus reduce profits from land use and hence reduce demand for land. This, in turn, will lead to a reduction in land use and a decline of land rents.

As already mentioned, the CAP 'greening' includes three measures: crop diversification, maintenance of permanent grassland and ecological focus area (set-aside). The 'greening' requirements reduce land productivity, because they constrain farms with respect to the crop choice and the use of land. In the case of crop diversification requirement, farms may be required to relocate land between crops, if they do not cultivate the required number of different crops, and if the maximum planting thresholds are not respected. Farms may plant a higher share of a less profitable crop to fulfill the crop diversification requirement. This leads to a reduction of land profitability, and hence in lower farm bids for land rent. The implications of the permanent grassland requirement are similar. If it would be optimal for farm to convert grassland to other uses in the absence of the SPS, then the 'greening' requirement will constrain the farm from doing so, causing a downward shift in land profitability. The ecological focus area requires withdrawing some land from production, which reduces returns from farming.

Reform IV is illustrated in Figure 3.  $c$  represents the per hectare productivity reduction induced by the 'greening' requirements.  $c$  is assumed to be constant. The productivity reduction  $c$  shifts the land demand curve with entitlement  $t^r$  downward from  $D_r D$  to  $D_c D_c$ . The equilibrium shifts from  $(A^* r^*)$  to  $(A_c^* r_c^*)$ . 'Greening' thus reduces land use (by  $A^* - A_c^*$ ) and the rental price (by  $r^* - r_c^*$ ).

In reality, the CAP 'greening' effect may differ significantly due to the existing heterogeneity in farms' production structure, specialization, geographical location and technology. Some farms may not need to adjust to the 'greening' requirements. This is the case, for example, if their production structure is already sufficiently diversified, if they have no incentive to convert grassland to other uses or if they possess strips of land economically not suitable for production. For some other farms, in particular those specialized in growing a single crop without fallow land, an adjustment in production structure might be required. This implies, that the 'greening' impact can vary between the MS, regions

<sup>15</sup> The actual size of these effects will depend on the farm heterogeneity because the implementation of the Reform III largely depends on farm characteristics (e.g. farms size, age of farmers).

<sup>16</sup> Note that both 'greening' and cross-compliance will be in place with the implementation of the 2013 CAP reform, hence their individual effects will reinforce each other.

and farms.<sup>17</sup>

### ***Reference period for entitlement allocation (Reform V)***

A key factor that will impact the capitalization effects is whether the new entitlement allocation will be different from the current allocation. If the new reference period is merely a formal requirement and does not affect the entitlement allocation there will obviously be no effect. However, if the post 2013 entitlements will be influenced by current (or future) land use, then farms (i.e. entitlement applicants) could adjust the amount of new entitlement by adjusting their land use. This would provide an opportunity to entitlement applicants to obtain entitlements for more land than they currently have.

This is not merely a theoretical consideration. In fact, both types of reference periods were applied in the 2003 CAP reform. The number of hectares that generated support in the reference period (i.e. the pre-reform land use) was applied as the base for entitlement allocation in the historical model, while the land used in the first year of the SPS application was used as the base in the hybrid and regional models.

According to the 2013 CAP reform, the MS can choose to maintain old (pre-reform) entitlements or to allocate new entitlements to farms who apply for it in 2015. Additionally, farmers will be required to be beneficiaries of decoupled CAP payments before 2014 (EU 2013). The latter system corresponds to the second system of entitlement allocation under the 2003 CAP reform, i.e. based on land use in the first year of the SPS application. The 2013 CAP reform has implications for the type of applicants that can obtain new entitlements, i.e. only those who had payments prior to 2014 can receive new entitlements. However, the 2013 CAP reform does not restrict the number of new entitlements that an applicant can obtain. Applicants can apply for a number of entitlements equal to their optimal land use (taking into consideration both the economic return from land and the entitlement value). This could have potentially important effects on the land market, depending on the existing capitalization.

The effects of the two systems of entitlement allocation are shown in Figure 4. We consider the situation before the implementation of the 2013 CAP reform with uniform entitlements  $t^r$ , implying that the land demand is given by  $D_r$  and the land market equilibriums are  $(A_{1r}^*, r_{1r}^*)$  and  $(A_2^*, r_2^*)$  in region 1 (represented by land supply curve  $S_1$ ) and region 2 (represented by land supply curve  $S_2$ ), respectively.

In a region where there are surplus entitlements in the pre-reform period (region 1 in Figure 4), the choice of the reference period may lead to a (small) reduction in land rents. The possibility to obtain new entitlements in the first year of the SPS implementation (in 2015 according to the reform) will incentivize farmers to obtain additional entitlements. The size of the increase in entitlements will depend on the availability of land because (as defined in the 2013 CAP reform) farms will be allocated new entitlements only if they are accompanied by an equal amount of eligible land. The 2013 CAP reform attempts to limit the increase of the number of entitlements. It stipulates that if the total claims for entitlements increase by more than 35% of the total eligible area in 2009, MS may

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<sup>17</sup> This also implies that the productivity reduction,  $c$ , may not be constant as assumed in Figure 3 but may change (increase or decrease) with land use.

limit the number of payment entitlements to be allocated in 2015 to either 135% or 145% of the total number of eligible hectares in 2009 (EU 2013). However, because with more entitlements and a fixed budget, the per unit entitlement will decline (to  $t^N$  in in Figure 4), and hence land rents will decline. The land rents and land use decline from  $r_{I_r}^*$  to  $r_I^N$  and from  $A_{I_r}^*$  to  $A_I^N$ , respectively.<sup>18</sup> This effect is likely very small (unless there would be a very large increase in entitlements, which appears unlikely). If the entitlement stock does not change significantly (e.g. due to the land availability constraint or other reasons) the land market effects will be virtually zero.<sup>19</sup>

A larger change may occur in a region without the SPS capitalization (region 2 in Figure 4) because the amount of entitlements was less than the available land. An increase in entitlements could shift the ratio of entitlements/land to the point that the entitlement constraint is no longer binding and the SPS capitalization would increase. This is illustrated in Figure 4. The equilibrium land rents and land use increase from  $r_2^*$  to  $r_2^N$  and from  $A_2^*$  to  $A_2^N$ , respectively. A small increase in entitlements has a disproportional effect on land markets as rents increase strongly because of the competition for land which has intensified at the margin.

Our results suggest that Reform V may be particularly distortive in those regions, where entitlements were in deficit in the pre-reform period. In regions with surplus entitlements, the SPS was already capitalized into land rents in the pre-reform period, implying that the reference period may have only small land market impacts and thus is not crucial for the SPS capitalization. From a theoretical point of view, the least distortive entitlement allocation system would be the one which ensures that the final stock of entitlements is in deficit relative to the optimal land use without the SPS. In Figure 4 this would correspond to the quantity of entitlements less than  $A_I^*$  in region 1 and less than  $A_2^*$  in region 2. Such an entitlement allocation would ensure that the SPS capitalization is kept at the pre-reform level in region 2 (which is zero), whereas it would be reduced to zero relative to the pre-reform period in region 1. However, this system of entitlement allocation is not very likely to occur (it could occur for example if the pre-reform entitlements are maintained in those MS which currently have deficit entitlements).

### ***Eligibility for entitlements: farms vs. landowners (Reform VI)***

Up to now we have assumed that only farms are eligible for the SPS. What if landowners receive the payments?

The past experience has shown that, despite the EU regulations implying that only farms were eligible for SPS entitlements, in several MS implementing the hybrid SPS model also “non-farming landowners” applied for and received entitlements. This was observed in particular in Finland, Sweden and UK (Ciaian, Kancs, and Swinnen 2010). Under the hybrid model, the entitlement allocation was based on land use in the first year of the SPS implementation, implying that anyone who had land could obtain entitlements.

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<sup>18</sup> Visually Figure 4 shows a large increase of entitlements (an increase from  $A_E^T$  to  $A_E^N$ ). However, this is only for illustrative purposes to reduce the complexity of the analysis. However, the results hold in general. In reality the increase in the number of entitlements will be likely smaller than visually apparent on the figure implying that  $A_E^N$  will be close to  $A_I^N$  in region 1 and  $A_E^N$  will be close to  $A_2^N$  in region 2.

<sup>19</sup> Analogously, if entitlement stock decreases in region 1, which is a less likely situation, the land use and land rents will increase.

The 2013 CAP reform attempts to prevent 'non-farming landowners' from obtaining entitlements by more closely defining the concept of 'active farmer'. According to the reform, the SPS can be granted only to those farms, whose agricultural land is kept in suitable agricultural conditions with minimum activity carried out on the land. Further, non-farming landowners or natural or legal persons whose agricultural activities form an insignificant share of their overall economic activities or if farming is not their main activity, may also be excluded from receiving SPS (EU 2013).

This specification is generic and whether non-farming landowners will be able to obtain entitlement will depend on the actual implementation and enforcement of this rule. Landowners could try to do this, for example, by adjusting the contractual relation with farms (e.g. by switching to short-term contract farming).

As indicated in the previous section, MS may allocate entitlements to farmers who apply for it in 2015 and may impose restriction that only those farmers are allocated entitlements who were SPS recipients prior to 2014 (EU 2013). This stipulation complicates the non-farming landowners' access to new entitlements, because it is not sufficient to own land in 2015; it also may require the receipt of the SPS prior to 2014. However, this stipulation will not prevent those non-farming landowners, who had SPS prior to 2014 to obtain new entitlements (e.g. in MS with hybrid model, those landowners who got hold on entitlements e.g. through a purchase)<sup>20</sup>.

From a policy perspective, the crucial question is whether it matters who initially owns/receives the entitlements, i.e. farmers versus landowners. It is clear from the previous analysis that when farms receive the entitlements part of the SPS (and in some cases all the SPS) may end up in higher land rents. What about the other way around? Is the SPS capitalization affected when landowners receive the entitlements? Again, the answer depends strongly on the ratio of entitlements to land supply and on the land supply elasticity.

The capitalization of the SPS is zero and benefits accrue only to those who receive the entitlements in the specific case when (a) the SPS are used, *and* (b) there is surplus land compared to the entitlements. This is the case of region 2 (represented by land supply curve  $S_2$ ) in Figure 1 and Figure 2. In this case, whoever gets the SPS entitlements gets the full subsidies since there is no impact on the land markets (the SPS does not distort land markets at the margin in this case). This holds for either the regional or historical model. It holds for farmers, and it also holds for landowners if they would receive the SPS entitlements.

However, in other situations it matters less (or not at all), whether farmers or landowners receive the entitlements – the effects in terms of land allocation and benefits for farmers and landowners are identical. That is when (a) SPS entitlements are in surplus and (b) there is trade in entitlements and (c) land markets work well, whether land owners or farmers own entitlements does not matter for the effects on land prices and land use.

The reason is that in order to get the actual subsidies, one need to have both entitlements and the land being used/kept in good condition. Hence *if surplus entitlements are given to farmers*, farmers will bid up the price of land to farm the land (and get prices for their products) and get direct payments. In this case the SPS lead to increased land rents and thus to gains for landowners. Farmers

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<sup>20</sup> For example, in Finland with the SPS introduction in 2006, most of the rental contracts were renewed with the modification that entitlements return to the landowner when the rental contract expires (Ciaian, Kancs and Swinnen 2010).

gain from the SPS but lose because of increased land rents.

*If entitlements are given to landowners*, landowners want farmers to farm the land so they (the landowners) can collect the subsidies and the rents. In this case, they are willing to rent the land for lower land rents than their (market) opportunity costs since they will get extra revenue (the SPS) if the land is farmed. This will lead to lower land rents, and thus to gains for the farmers – despite the fact that they do not directly benefit from the SPS. Landowners gain from the SPS but lose because land rents decline.

This is illustrated by Figure 5. It compares the results when farmers are entitlement owners, with the situation when landowners receive the SPS entitlements. To keep the graphical analysis tractable, we use the scenario of a regional model (with flat-rate SPS as proposed by the 2013 CAP reform to replace the historical and hybrid models) with surplus entitlements.

In Figure 5 when farmers are granted entitlements  $t'$ , land demand is given by  $D_r D$ , and the land market equilibrium is  $(A_{lr}^*, r_{lr}^*)$  in a surplus entitlement region (region 1). If entitlements are granted to landowners (which are not farmers by assumption), then entitlements,  $t'$ , do not affect the land demand (it stays at curve  $DD$ ) but shifts the land supply from curve  $S_l S_l$  to  $S_{lr} S_l$ . The new equilibrium is  $(A_{lr}^*, r_{ll}^*)$ . Compared to a situation when farmers are entitlement owners, land use is the same. Land rent is lower but the difference in rental rates is equal to the entitlement value,  $r_{lr}^* - r_{ll}^* = t'$ . Hence, entitlement ownership does not affect the capitalization effects. In both cases (farmers owning entitlements and landowners owning entitlements), the SPS cause an increase in landowner incomes of area  $B$ , and an increase in farm incomes of area  $E$ .

These results are in line with studies on production subsidies (in closed economies). For example, Gardner (2002) shows that consumer subsidies and producer subsidies have identical effects (in closed economies with well-functioning markets).<sup>21</sup> This result is conditional on well-functioning land markets. If there are imperfections and/or formal and informal institutions in place, the results may differ. However, this depends on the type of land market imperfection or land market institutions (see for example Ciaian and Swinnen (2006, 2009) for analysis on how land market transaction costs, imperfect competition and credit market imperfections affect subsidy capitalization). Important in this context are those imperfections and/or formal and informal institutions that reduce rental price adjustments such as rental price control or long duration of the rental contracts (Ciaian, Kancs, and Swinnen 2010). In the presence of rental price rigidities, rental price adjustments will occur more slowly implying that a larger share of benefits will accrue to those who receive/own entitlements even in the case of surplus entitlements.

### **Implications of the theoretical analysis on capitalization of the reformed SPS**

Up to now we have analyzed the effects of each element of the SPS reform separately. The different reform elements can reinforce or offset each other. Therefore Table 3 and Table 4 provide an overview of the combined effects. Consistent with the options available under the 2013 CAP reform,

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<sup>21</sup> The equivalence of a consumption subsidy and a production subsidy is a standard result in welfare analysis: subsidies for production stimulate an increase in supply, thereby benefiting consumers from a lower consumption price; while subsidies for consumption stimulate an increase in demand, thereby increasing prices, which increases producer incomes. (These results do not hold in an open economy model since prices may be determined on the international markets. However, this matter less for our paper since MS farmland is not traded in international markets).



Table 3 presents the expected effects when the base for allocation of entitlements is the pre-reform period and Table 4 when the base is the first year implementation of the 2013 CAP reform. Note that the indicated size of the effects is mostly indicative and should be interpreted with care as there is insufficient data to estimate the actual size of the combined effects. For this reason we discuss our results in light of empirical findings of previous studies on SPS.

Columns in Table 3 and Table 4 summarize the theoretical impacts of the various reform elements discussed in section 4 and rows organize these effects by different SPS implementation models. Columns 1-3 use characteristics of the 2013 CAP reform to classify different “prototypes”. More specifically, the prototypes are distinguished by the following elements: (i) the impact of payment harmonization on the MS budget for the SPS (column 1), (ii) the current stock of entitlements relative to the eligible area (column 2), and (iii) the current SPS model (column 3). Columns 5 and 6 summarize the expected impact of the 2013 CAP reform with respect to the SPS budget (both aspects of Reform I); column 7 the impact of the move to a flat-rate SPS (Reform II); column 8 the impact of differentiation of the SPS (Reform III); column 9 the impact of the CAP greening (Reform IV); column 10 the impact of the reference period for entitlement allocation (Reform V); and column 11 presents an estimate of the aggregate impact. The last column lists potential examples of countries which may fit the different prototypes.

The results summarized in Table 3 and Table 4 refer to the SPS capitalization change in the post-reform period relative to the pre-reform period as a combined package; i.e. the individual effects of each reform element take into consideration the fact that other reform elements are also in place, meaning that we consider interaction between different reforms. A larger number of plus (minus) signs reported in the tables implies a higher expected increase (decrease) in the capitalization rate relative to its pre-reform level.

The first major observation arising from these tables is that the SPS capitalization rate will be affected by the 2013 CAP reform vis-à-vis the pre-reform period. Second, our findings suggest a significant variation between the prototypes, reflecting strong heterogeneity in the application of the SPS and reform elements across the EU. In fact, of the 18 identified prototypes, we expect that 13 may be actually implemented in different MS (column 12). Third, the capitalization effect of the reform can go in either direction (decrease or increase) depending on the implementation. The key determinant of the capitalization effect is the reference period for entitlement allocation (Ref. V) as the differences between Table 3 and Table 4 show. Fourth, the regionalization (Ref. II) and the reference period for entitlement allocation (Ref. V) have zero or positive impact on land rents, whereas the other three reform elements have zero or negative impact on land rents.

The effects summarized in Table 3 suggest that, if entitlements are maintained as they are now, then in most MS the overall impact on land prices will be zero or negative, and likely rather limited.<sup>22</sup> In MS with deficit entitlements (prototypes 4-6, 10-12 and 16-18), the reform will slightly reduce the SPS capitalization (Table 3). This is because the stock of entitlement will not change (i.e. it remains in deficit) so none of the effects will affect the capitalization (except for the greening). Theoretically,

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<sup>22</sup> Note that in our analysis we do not assume farm structural change. In reality if significant structural changes occur in the agricultural sector between the reference pre-reform period and the time of the reform implementation, then the SPS might be capitalized into land rents in the post-reform period. However, this will occur only if entitlement tradability is constrained. More on the entitlement tradability and structural change see Ciaian, Kancs, and Swinnen (2008).

with deficit entitlements the SPS does not affect land markets at the margin, implying that the entitlement allocation system (Ref. V), the regionalization (Ref. II), the CAP budget cut (Ref. I), and differentiation of the SPS between farms (Ref. III) will not affect the SPS capitalization. However, the CAP greening (Ref. IV) applies to all agricultural area and will therefore reduce land prices, irrespective of the stock of entitlements and the entitlement allocation system, but this effect may be quite small. The empirical results of Michalek, Ciaian, and Kancs (2014) confirm that additional requirements (cross-compliance) associated with the SPS reduce land rents in the EU. Similarly, Johansson and Nilsson (2011) find for Sweden and Kilian et al. (2012) find for Germany that agro-environmental payments are negatively correlated with land prices, which suggests that environmental constraints linked to payments impose additional costs on farmers.

In MS with surplus entitlements (prototypes 1-3, 7-9 and 13-15), the 2013 CAP reform has a negative effect on the SPS capitalization (Table 3). With surplus entitlements, the SPS affects land markets at the margin, implying that additionally to the CAP greening (Ref. IV), the CAP budget cut (Ref. I) and the differentiation of the SPS between farms (Ref. III) will also reduce the SPS capitalization. Altogether, these three effects are expected to more than offset the positive impact of moving to a flat-rate SPS (Ref. II). The exception is prototype 13 where capitalization is expected to slightly increase in the post-reform period. Prototype 13 represents the situation where MS would gain from harmonization of the SPS (part of Ref. I) and together with the positive effect of moving to a flat-rate SPS (Ref. II) they more than offsets the negative impacts of the other reforms leading to an overall positive effect. However, it is little likely that this prototype will not be actually implemented in any of the MS.

These theoretical results are consistent with empirical findings of previous studies on the SPS, which find a higher capitalization rate in regions with surplus entitlements compared to regions with deficit entitlements. Johansson and Nilsson (2012) analyze the SPS impacts in Sweden, and Kilian et al. (2012) analyze the SPS impacts in Bavaria (Germany) and find a comparably high capitalization rate. The former study finds that the elasticity of agricultural land price with respect to the SPS is estimated at 0.62 (i.e. one percent increase in the SPS increases land sales price by 0.62%), whereas the latter study finds that 44% to 94% of the SPS are capitalized into land rental prices. In both Sweden and Germany the entitlement/UAA ratio is (almost) one (see Table 2), which, according to our theoretical results is expected to cause a higher capitalization of the SPS. In contrast, Michalek, Ciaian, and Kancs (2014) find that the capitalization rate is lower in those regions, where the entitlement/UAA ratio is lower. Similarly, Guastella et al. (2013) find a statistically insignificant impact of the SPS on land rents in Italy, which has deficit entitlements.

The strongest reduction in the capitalization rate in Table 3 is expected for prototypes 3, 9 and 15. They represent MS with the regional SPS model and surplus entitlements implying relatively strong DP capitalization in pre-reform period. The CAP budget cut (Ref. I), the differentiation of SPS among farms (Ref. III) and the CAP greening (Ref. IV) will reinforce each other in lowering capitalization, and thus land prices. This may also apply to some of the new MS, despite the SPS budget harmonization attempts between the new MS and the old MS (EU 2013). The new MS implement a regional system of payments which implies that downward pressures on land values will prevail after the 2013 CAP reform (Ref. I, Ref. III, Ref. IV), whereas positive drivers will be virtually

non-existent; i.e. the regionalization effect (Ref. II) will be zero in these countries, only the payment harmonization effect (Ref. I) will reduce the land rents in prototype 15.

Empirically, these theoretical results are confirmed by Michalek, Ciaian, and Kancs (2014), whose empirical estimates suggest that the SPS capitalization rate decreases with variation in the SPS value: the hybrid model has higher capitalization rate than the historical model. This is also consistent with findings of Johansson and Nilsson (2012) for Sweden and Kilian et al. (2012) for Bavaria (Germany). The fact that they find much higher SPS capitalization rates is consistent with the implementation model: Sweden uses the hybrid model and Bavaria the regional model, which are expected to have higher capitalization than the historic models.

For the prototypes representing the hybrid/historical models with surplus entitlements (prototypes 1, 2, 7, 8, 13, and 14), the expected reduction in land values due to the 2013 CAP reform is smaller than in prototypes 3, 9 and 15, or land values may even increase. This is because the negative effect on land values due to the CAP budget cut (Ref. I), the differentiation of the SPS among farms (Ref. III) and the CAP greening (Ref. IV) is partially or fully offset by the positive effect of payment harmonization across farms (Ref. II). The harmonization of payments across farms will increase the SPS capitalization. The estimates of Michalek, Ciaian, and Kancs (2014) confirm that the SPS capitalization reduces with the variation in the SPS value; the capitalization rate is considerably higher for low levels of the SPS than for high levels, i.e. low SPS levels determine the level of capitalization (at the margin). The capitalization rate varies between 11% and 94% for the SPS smaller than 200 €/ha in the EU-15. For larger payments (the SPS greater than 200 €/ha), the capitalization rate is between 3% and 11%.

A comparison of Table 3 and Table 4 shows that the choice of the reference period for the SPS entitlement allocation (Reform V) does not matter for ‘surplus regions’ (the effects are the same in both tables) (prototypes 1-3, 7-9 and 13-15) but may play an important role in ‘deficit regions’ (prototypes 4-6, 10-12 and 16-18). The entitlement allocation based on land use in the first year of the 2013 CAP reform (Table 4) may turn a region with deficit entitlements into surplus entitlements which may cause a significant increase in land rents due to the SPS capitalization. Combined with the move to the flat-rate (Ref. II), land values may increase - an increase which may not be fully offset by reduced pressure on land values due to the CAP budget cut (Ref. I), the differentiation of the SPS between farms (Ref. III) and the CAP greening (Ref. IV). Hence, in several MS (prototypes 4-6 and 16-18) land values may increase due to the 2013 CAP reform.

These results are in line with the discussions and negotiations of the 2013 CAP reform, as a result of which the flexibility for entitlement allocation system was modified and extended. The initial proposal of the European Commission tabled in 2011 envisaged the entitlement allocation based on the land use in the first year of the reform (as considered in Table 4) (European Commission 2011a). On the other hand, the final political agreement on the reform reached in 2013 extended the options to MS by allowing certain MS to maintain the existing entitlements allocated prior to 2014 (as considered in Table 3) as well as it allows MS to limit the number of SPS entitlements to be allocated in 2015 to either 135% or 145% of the total number of eligible hectares if the total entitlement claims increase by more than 35% of the total eligible area in 2009.

Despite the comprehensiveness of the analysis, one should interpret the results reported in

Table 3 and Table 4 with care, as there are several factors that do not allow predicting the capitalization effects with the necessary accuracy. For example, in reality, the size of the effects will depend on the actual application and enforcement of different reforms, as MS have certain flexibility for reform implementation. The effects will also depend on perception of landowners and farmers about the continuation of the SPS in medium term. The SPS may be subject to future reform which may adjust both the implementation rules as well as the level of the payment. Further, the effects reported in the two tables provide theoretically expected effects of the reform derived from our analysis. To obtain an actual estimate, one needs to conduct empirical estimations when the data will become available, which is a promising area for future research. The analysis presented in this section provides the expected direction of change of particular reform elements on the SPS capitalization.

## **Conclusions**

The objective of this paper is to analyze the impact of the 2013 CAP reform on the SPS capitalization in the EU. Our starting point is insights from the 2003 CAP reform, which has been analyzed theoretically e.g. by Courleux et al. (2008), Ciaian, Kancs, and Swinnen (2008) and Kilian and Salhofer (2008). According to these theoretical studies, there might be a significant capitalization of the SPS into land values, varying between regions in the EU. The impact of the SPS on land prices depends among others on: the ratio of the SPS entitlements to the eligible land, the implementation model (historical vs. regional), the tradability of the entitlements, the elasticity of land supply, the cross-compliance requirements, the land market regulations, the capital market imperfections, and the length of rental contracts (Courleux et al. 2008; Ciaian, Kancs, and Swinnen 2008; Kilian and Salhofer 2008).

Our theoretical analysis confirms previous findings that the implementation details of the CAP reform will determine the SPS capitalization into land values. The effects will likely vary across farms, regions and Member States, depending on the pre- and post-reform implementation of the SPS. If the stock of entitlements is maintained at the level of the pre-reform period, then land values are expected to decrease in most MS. This will be driven in particular by the SPS budget cut, the CAP 'greening' and the SPS payment differentiation. However, if entitlements are allocated based on land use in the post-reform period, then the SPS capitalization is expected to increase in several MS. An important driver for this effect is the ratio of the SPS entitlements to the eligible area in the pre-reform period. The strongest increase in the SPS capitalization may occur in those MS, which had deficit entitlements in the pre-reform period, because, in theory, the SPS should not be capitalized into land values in the pre-reform period. In contrast, we expect that in the post-reform period the SPS will drive land values up due to the expansion of the entitlement stock leading to stronger competition on land market and higher land values. On the other hand, in MS with surplus entitlements in the pre-reform period, the SPS capitalization will likely decrease, if entitlements are allocated based on land use in the post-reform period. In these MS the SPS is likely capitalized into land rents already now, implying that the 2013 CAP reform may actually reduce land values, e.g. due to the SPS budget cut, the CAP 'greening' and the SPS payment differentiation.

However, the identification of the net effect of the 2013 CAP reform is not straightforward, because different reform elements may have a differentiated and/or offsetting impact on the SPS

capitalization, and hence on farmers' policy gains. For example, the SPS capitalization will depend on the actual application and enforcement of different reforms, as MS have certain flexibility in practical implementation of the 2013 CAP reform. Further, the current SPS implementation and capitalization also plays a role in the impact of the CAP reform on future land markets. Finally, the SPS is subject to future adjustments and reforms, implying that the capitalization of the 2013 reform will also depend on the perception of farmers and landowners about certainty and stability of the new legislation in the medium to long run. Therefore, the arguments in this paper should be interpreted with care.

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Figure 1. The effect of the SPS harmonization between MS

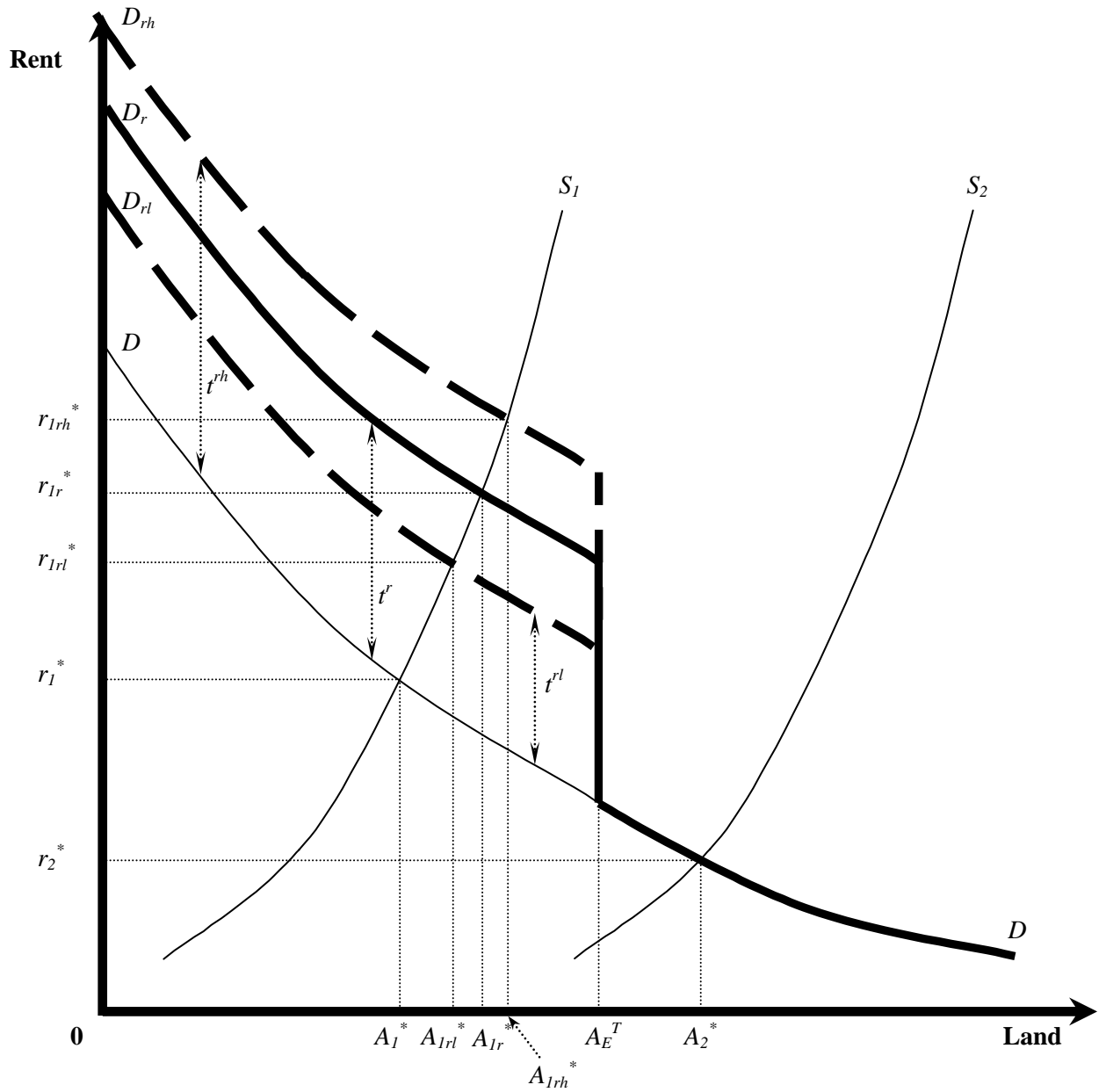




Figure 2. The effect of the SPS with surplus and deficit entitlements

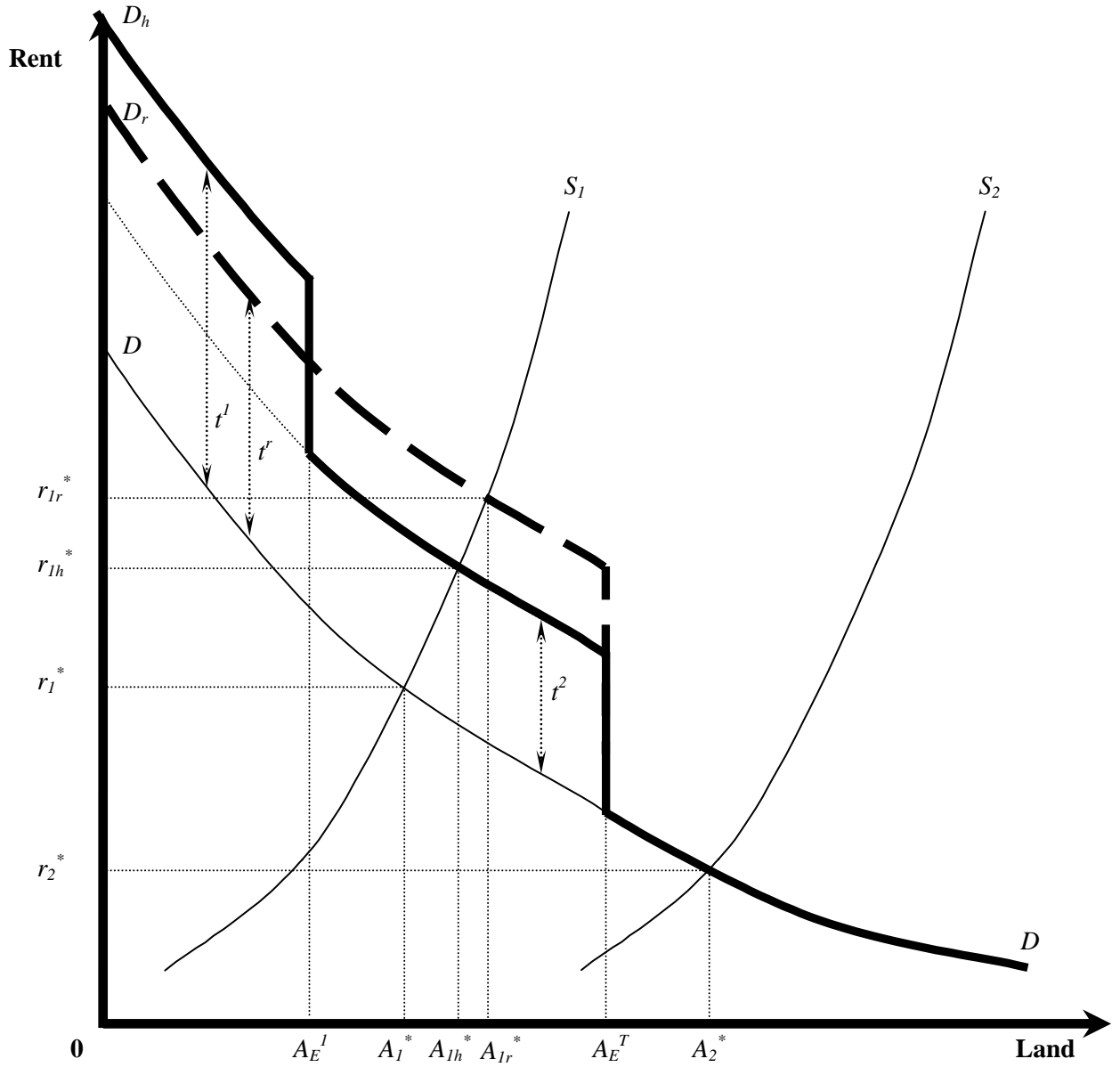


Figure 3. The effect of CAP 'greening'

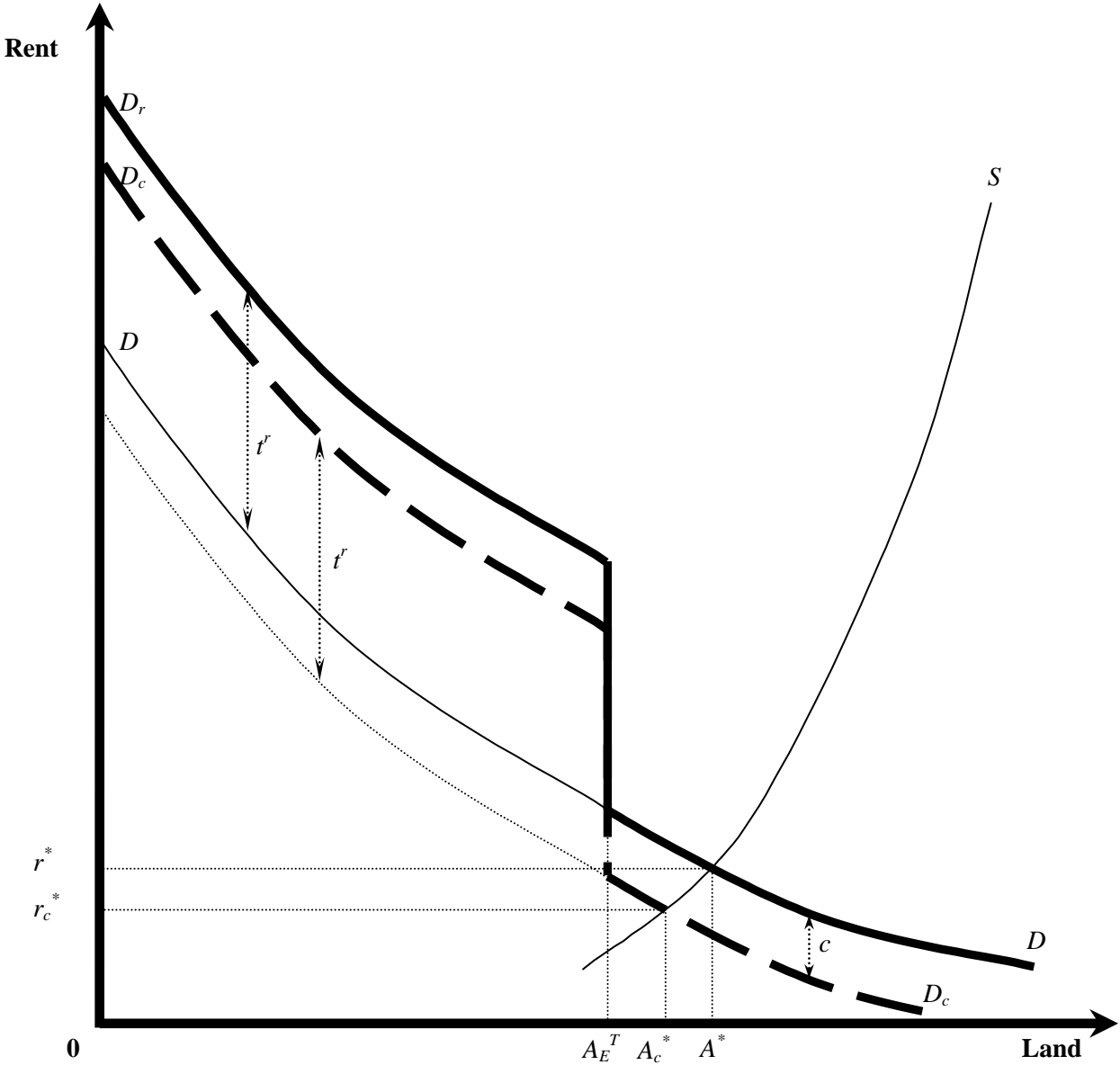


Figure 4. The effect of the reference period

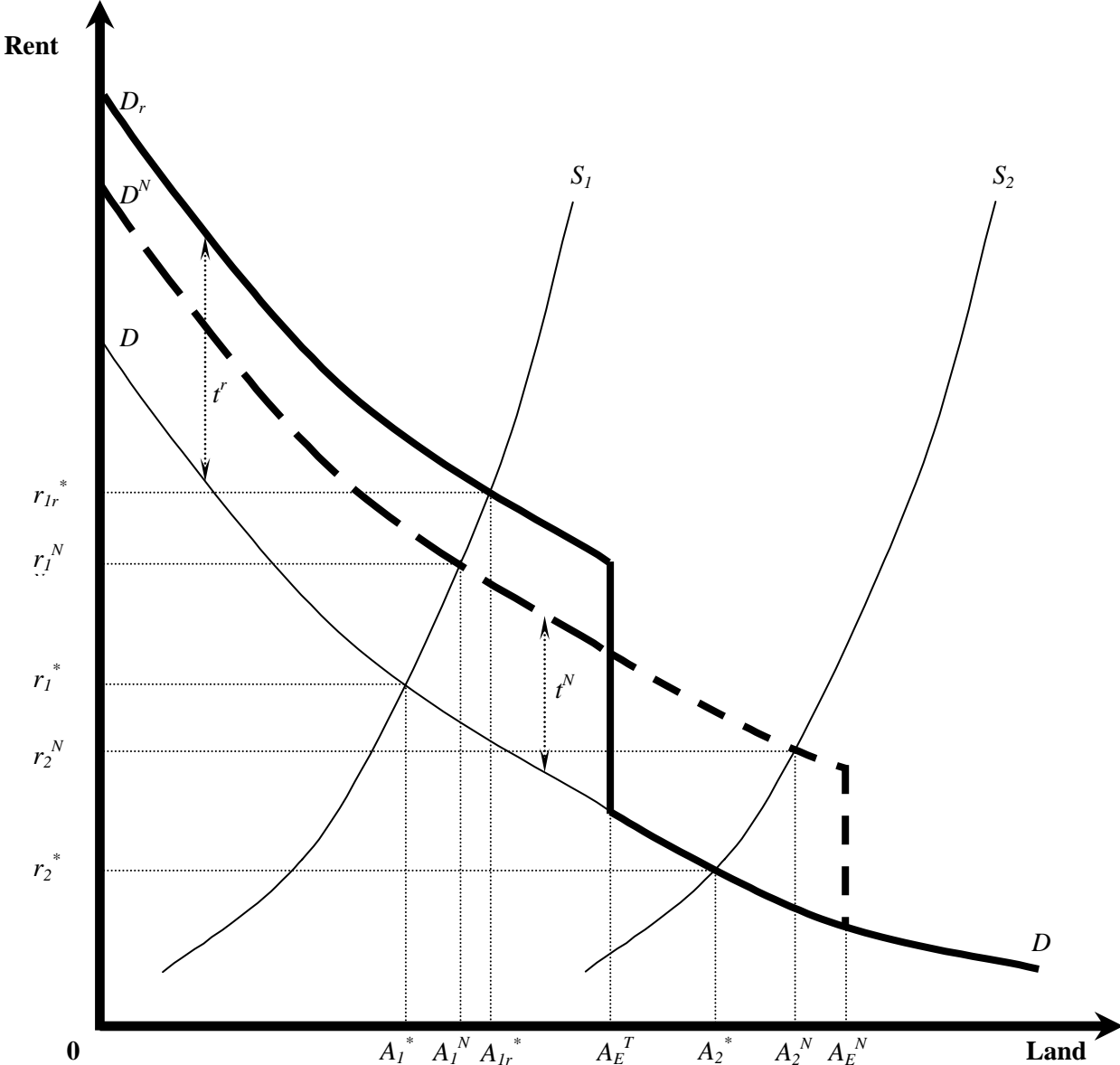
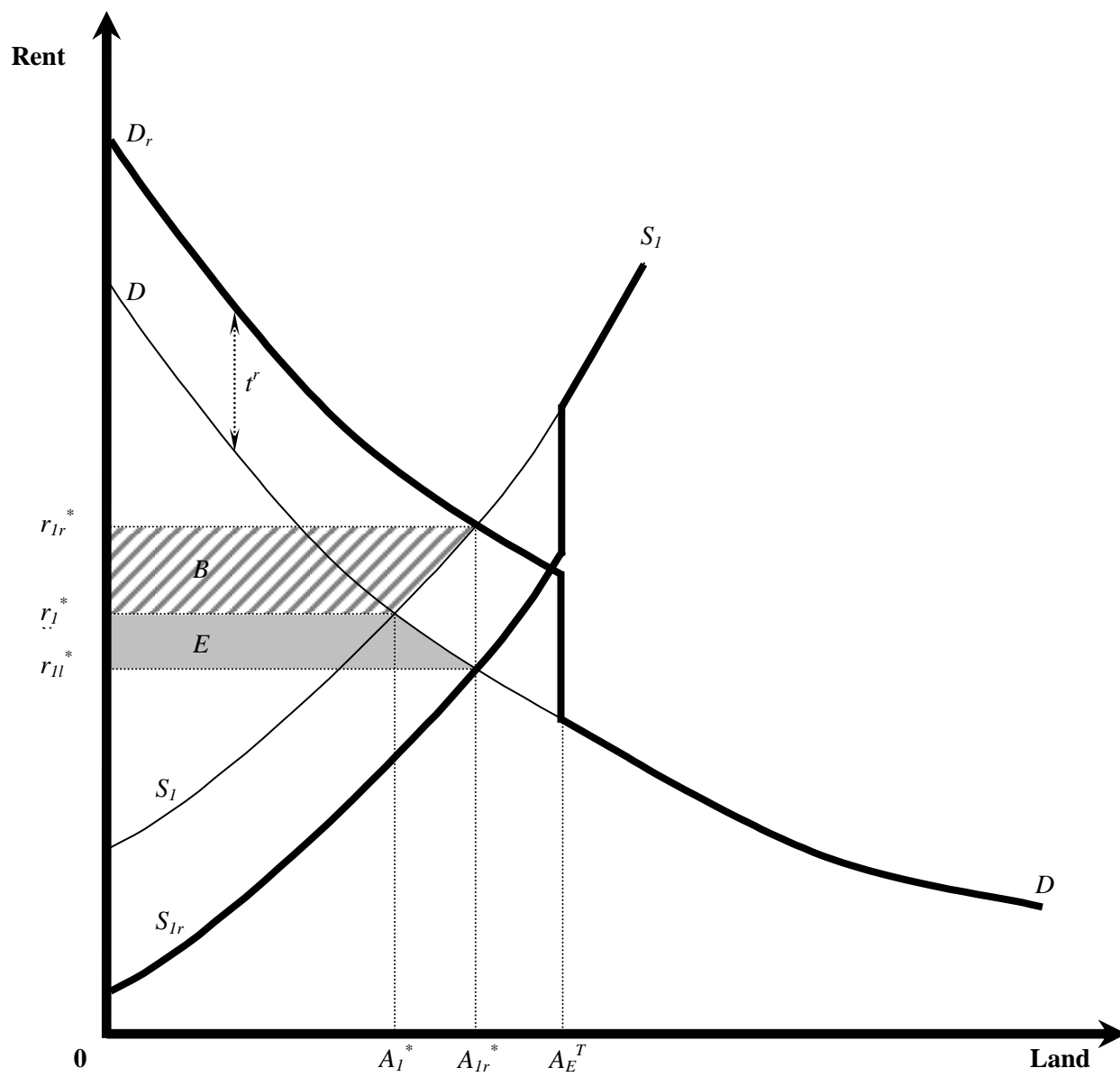


Figure 5. The effect of the landowners' entitlement ownership



**Table 1. SPS implementation by Member State**

Model SPS / SAPS	MS (start date)
SPS historical	Austria (2005), Belgium (2005), France (2006), Greece (2006), Ireland (2005), Italy (2005), Netherlands (2006), Portugal (2005), Spain (2006), UK (Wales and Scotland)
SPS regional	Malta (2007), Slovenia (2007)
SPS static hybrid	Luxemburg (2005), Sweden (2005), UK (N. Ireland, 2005)
SPS dynamic hybrid	Denmark (2005), Finland (2006), Germany (2005), UK (England 2005)

**Notes:** Those MS implementing the dynamic hybrid model move gradually to a fully regional model. In MS implementing the static hybrid model, the regional and the historical shares do not change over time (European Commission 2007a)

**Source:** European Commission.

**Table 2. UAA and the SPS activated area in 2010**

	SPS activated area (1000 ha)			Ratio of activated area to UAA (%)		
	2007	2009	2011	2007	2009	2011
Belgium	1168	1151	1153	0.85	0.84	0.85
Denmark	2679	2643	2627	0.99	1.00	0.98
Germany	16737	16731	16658	0.99	0.99	1.00
Ireland	4606	4164	-	1.08	0.99	-
Greece	5537	5774	-	1.39	1.51	-
Spain	14959	15368	16445	0.60	0.64	0.68
France	24151	26140	25730	0.82	0.74	0.88
Italy	8116	8235	8551	0.56	0.62	0.66
Luxembourg	124	124	124	0.94	0.95	0.95
Malta	7	6	7	0.70	0.62	0.62
Netherlands	1285	1348	1369	0.68	0.70	0.74
Austria	2721	2696	2680	0.84	0.85	0.93
Portugal	2418	2342	2295	0.66	0.63	0.64
Slovenia	428	444	435	0.86	0.95	0.95
Finland	2304	2288	2277	1.02	1.00	0.99
Sweden	3146	3036	2991	1.01	0.99	0.98
United Kingdom	15294	14867	15151	0.86	0.86	0.88

Source: SPS entitlements: European Commission; UAA used to calculate the ratio of activated area to UAA: Eurostat. If data were not available for a given year, the value from previous year was used. Notes: (i) the table reports only the number of activated entitlements, which is different from the total allocated entitlements. Farmers may also hold additional entitlements, which they may not be able to use due to the unavailability of eligible land. The data on the amount of these unused entitlements are not available. In principle, the activated entitlements should not exceed the UAA, whereas the total allocated entitlements may exceed the UAA. Note that the number of activated areas for SPS may exceed the UAA in the case that farmers receive entitlements on common land (e.g., Greece) or if they receive entitlements with special conditions which are claimed against livestock and do not require land for their activation. (ii) UAA may not exactly correspond to eligible area. According to the European Commission, "eligible land means any agricultural area of the holding, and any area planted with short rotation coppice, that is used for an agricultural activity or, where the area is used as well for non-agricultural activities, predominantly used for agricultural activities" (European Commission 2011c).

**Table 3. Expected impact of the 2013 CAP reform on land values when entitlements are maintained at the level of pre-reform period**

MS level effect of harmonization on SPS budget	Stock of entitlements relative to land use (current)	Type of the SPS model (current)	Prototype	Harmonization between MS (Ref. I)	SPS budget cuts (Ref. I)	Regionalization (Ref. II)	Differentiation (Ref. III)	CAP 'greening' (Ref. IV)	Reference period (pre-reform entitlement stock) (Ref. V)	Total (net) expected impact	Examples of MS	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
No (or minor) change in SPS budget	Surplus	Historical	<b>1</b>	0	–	+++	–	–	0	0	IE	
		Hybrid	<b>2</b>	0	–	++	–	–	0	–	FI, SE	
		Regional, SAPS	<b>3</b>	0	–	0	–	–	0	– – –	BG, CZ, HU, PL	
	Deficit	Historical	<b>4</b>	0	0	0	0	–	–	0	–	ES, AT, UK-ST, UK-WL
		Hybrid	<b>5</b>	0	0	0	0	0	–	0	–	UK-EN, UK-NI
		Regional	<b>6</b>	0	0	0	0	0	–	0	–	
Reduction in SPS budget	Surplus	Historical	<b>7</b>	–	–	+++	–	–	0	–	GR	
		Hybrid	<b>8</b>	–	–	++	–	–	0	– –	DE, DK	
		Regional, SAPS	<b>9</b>	–	–	0	–	–	–	0	– – – –	CY
	Deficit	Historical	<b>10</b>	0	0	0	0	0	–	0	–	BE, FR, NL, IT
		Hybrid	<b>11</b>	0	0	0	0	0	–	0	–	LU
		Regional	<b>12</b>	0	0	0	0	0	–	0	–	MT, SI
Increase in SPS budget	Surplus	Historical	<b>13</b>	+	–	+++	–	–	0	+		
		Hybrid	<b>14</b>	+	–	++	–	–	0	0		
		Regional, SAPS	<b>15</b>	+	–	0	–	–	–	0	– –	EE, LT, LV, SK, RO
	Deficit	Historical	<b>16</b>	0	0	0	0	0	–	0	–	PT
		Hybrid	<b>17</b>	0	0	0	0	0	–	0	–	
		Regional	<b>18</b>	0	0	0	0	0	–	0	–	

Notes:

'+' ('–') stands for an increase (decrease) in the SPS capitalization rate; a larger number of plus (minus) signs implies a higher expected increase (decrease) in the capitalization rate.

'0' stands for no change in the SPS capitalization rate.

Country codes: Belgium (BE), Bulgaria (BG), France (FR), Austria (AT), Italy (IT), Poland (PL), Czech Republic (CZ) Cyprus (CY), Portugal (PT), Denmark (DK), Latvia (LV), Romania (RO), Germany (DE), Lithuania (LT), Slovenia (SI), Estonia (EE), Luxembourg (LU), Slovakia (SK), Ireland (IE), Hungary (HU), Finland (FI), Greece (GR), Malta (MT), Sweden (SE), Spain (ES), Netherlands (NL), United Kingdom (UK), England (EN), N. Ireland (NI), Scotland (ST), Wales (WL).

*Assumptions on MS categorization:* MS with activated entitlements equal or higher (lower) than 98% of UAA where assumed to have surplus (deficit) entitlements; The new MS implementing the Single Area Payment Scheme (SAPS) are categorized under the regional SPS model. The SAPS is a standard area subsidy paid per hectare of land without entitlements, all land is eligible and all farms receive a uniform payment. Conceptually, this payment corresponds to the regional SPS model with infinite stock of entitlements. For more detailed theoretical analysis on the SAPS and its deference compared to the SPS see Ciaian and Swinnen (2006) and Courleux et al. (2008). The MS categorization in column 1 is based on European Commission (2013, p. 8).

**Table 4. Expected impact of the 2013 CAP reform on land values with entitlement allocation based on land use in the post-reform period**

MS level effect of harmonization on SPS budget	Stock of entitlements relative to land use (current)	Type of the SPS model (current)	Prototype	Harmonization between MS (Ref. I)	SPS budget cuts (Ref. I)	Regionalization (Ref. II)	Differentiation (Ref. III)	CAP 'greening' (Ref. IV)	Reference period (entitlement allocation based on the first year of reform implementation) (Ref. V)	Total (net) expected impact	Examples of MS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
No (or minor) change in SPS budget	Surplus	Historical	<b>1</b>	0	-	+++	-	-	0	0	IE
		Hybrid	<b>2</b>	0	-	++	-	-	0	-	FI, SE
		Regional, SAPS	<b>3</b>	0	-	0	-	-	0	---	BG, CZ, HU, PL
	Deficit	Historical	<b>4</b>	0	-	+++	-	-	+	+	ES, AT, UK-ST, UK-WL
		Hybrid	<b>5</b>	0	-	++	-	-	++	+	UK-EN, UK-NI
		Regional	<b>6</b>	0	-	0	-	-	++++	+	
Reduction in SPS budget	Surplus	Historical	<b>7</b>	-	-	+++	-	-	0	-	GR
		Hybrid	<b>8</b>	-	-	++	-	-	0	--	DE, DK
		Regional, SAPS	<b>9</b>	-	-	0	-	-	0	----	CY
	Deficit	Historical	<b>10</b>	-	-	+++	-	-	+	0	BE, FR, NL, IT
		Hybrid	<b>11</b>	-	-	++	-	-	++	0	LU
		Regional	<b>12</b>	-	-	0	-	-	++++	0	MT, SI
Increase in SPS budget	Surplus	Historical	<b>13</b>	+	-	+++	-	-	0	+	
		Hybrid	<b>14</b>	+	-	++	-	-	0	0	
		Regional, SAPS	<b>15</b>	+	-	0	-	-	0	---	EE, LT, LV, SK, RO
	Deficit	Historical	<b>16</b>	+	-	+++	-	-	+	++	PT
		Hybrid	<b>17</b>	+	-	++	-	-	++	++	
		Regional	<b>18</b>	+	-	0	-	-	++++	++	

Notes:

'+' ('-') stands for an increase (decrease) in the SPS capitalization rate; a larger number of plus (minus) signs implies a higher expected increase (decrease) in the capitalization rate.

'0' stands for no change in the SPS capitalization rate.

Country codes: Belgium (BE), Bulgaria (BG), France (FR), Austria (AT), Italy (IT), Poland (PL), Czech Republic (CZ) Cyprus (CY), Portugal (PT), Denmark (DK), Latvia (LV), Romania (RO), Germany (DE), Lithuania (LT), Slovenia (SI), Estonia (EE), Luxembourg (LU), Slovakia (SK), Ireland (IE), Hungary (HU), Finland (FI), Greece (GR), Malta (MT), Sweden (SE), Spain (ES), Netherlands (NL), United Kingdom (UK), England (EN), N. Ireland (NI), Scotland (ST), Wales (WL).

*Assumptions on MS categorization:* MS with activated entitlements equal or higher (lower) than 98% of UAA where assumed to have surplus (deficit) entitlements; The new MS implementing the Single Area Payment Scheme (SAPS) are categorized under the regional SPS model. The SAPS is a standard area subsidy paid per hectare of land without entitlements, all land is eligible and all farms receive a uniform payment. Conceptually, this payment corresponds to the regional SPS model with infinite stock of entitlements. For more detailed theoretical analysis on the SAPS and its deference compared to the SPS see Ciaian and Swinnen (2006) and Courleux et al. (2008). The MS categorization in column 1 is based on European Commission (2013, p. 8).