Passive Farming: Hindering Agricultural Development or Preserving Valuable Landscapes?

Mark Brady[1,2], Jordan Hristov[1], Christoph Sahrbacher[3], Torben Söderberg[4] and Fredrik Willhelmsson[5]*

[1] AgriFood Economics Centre, Dept. of Economics, Swedish University of Agricultural Sciences (SLU). [2] Center for Environmental and Climate Research (CEC), Lund University. [3] Leibniz Institute of Agricultural Development in Transition Economies (IAMO), Halle (Saale), Germany. [4] Swedish Board of Agriculture, Jönköping, Sweden.[5] AgriFood Economics Centre, Lunds universitet.

* Correspondence to: Mark Brady, Box 730, S-220 07 Lund, SWEDEN. Phone: +46 (0) 46 222 07 84.

Email: mark.brady@slu.se

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Abstract

We aim to identify and evaluate factors that might influence the incidence and scale of passive farming—when land owners maintain their land to collect CAP support payments without producing commodities—and ultimately conclude whether it could be hindering agricultural development or is contributing to the preservation of agricultural landscapes. We show that it is rational to choose passive farming when it is neither profitable for land owners to farm their land themselves nor for a potential lessee to offer a *sufficiently* high rent to make it worthwhile for the owner to let out their land. Consequently, if a rental offer is made but falls short of the land owner's acceptable rent, it could explain the frustration experienced by some active farmers in not getting access to passively farmed land and the contention that the land is locked in. As such the land is simply not profitable to farm given current market prices. The results of the empirical simulations show that reducing the Single Farm Payment (SFP) or stiffening the associated minimum land management obligation (in marginal regions) would eliminate passive farming, but also result in even less land being used in agricultural production. Increasing the current SFP, however, did not affect the area of passively farmed land, since the lessees' willingness to pay also increased with the higher payment level. Rather the higher payment capitalized into rental prices. Consequently the existence of passive farming is not likely to be hindering agricultural development but rather preventing land from being abandoned.

JEL classification:
Key words: CAP, Single Farm Payment, decoupling, rural development, policy

Introduction

Currently, as much as 20−30% of the agricultural area in some regions of the EU is not being used in commodity production, but is managed as grass-sown fallow to meet the minimum land management obligation for collecting Common Agricultural Policy (CAP) direct payments (Trubins, 2013). Land owners who manage their entire agricultural area as fallow are being referred to – somewhat derogatorily – as passive or couch farmers, while those producing commodities are active farmers (e.g., Ander, 2012b). Passive farming has emerged as a consequence of simultaneously decoupling CAP direct payments from production and removing the ceiling on the area of fallow (set-aside) eligible for payments through introduction of the Single Farm Payment scheme (SFP) in 2005 (Ciaian et al., 2010). Today, farmers need not produce commodities to receive support in the form of the SFP as long as they keep their land in *Good Agricultural and Environmental Condition* (GAEC). Consequently some land owners have chosen not to produce any commodities, but to maintain their entire agricultural area as fallow to meet the minimum GAEC obligation. In some quarters this behavior is claimed to be impeding agricultural development and the competitiveness of European farming, because it prevents farmers "active" in commodity production from accessing the additional land that is necessary for farm growth (Ds, 2014:6, p. 112, Wahlberg, 2014, Vernersson, 2012).

In chorus the land managed by passive farmers is referred to as being underutilized or "locked in" because it could, ostensibly, be used for producing commodities by expansion-willing active farmers. It is known that the SFP scheme has resulted in more farmers remaining longer in the sector and thus slowing structural change (Brady et al., 2012, Ciaian et al., 2010). The mechanisms lying behind landowners choosing passive farming rather than producing commodities or releasing their land to an active farmer has though not been studied. In particular it is unclear to what degree the perceived land lock-in is in conflict with CAP goals, particularly the prevention of land abandonment (Rioufol, 2011). The critical issue is therefore to understand why landowners are choosing passive farming rather than assuming that they are unilaterally obstructing agricultural development. We aim therefore to evaluate factors that might influence the choice of passive farming instead of letting the land to an active farmer; and ultimately deduce whether passive farming is likely to be hindering agricultural development through land lock-in.

First we review the limited literature on passive farming and conceptualize land lock-in. We then develop a theoretical model of the agricultural land owners' land-use decision and determine under what conditions they would choose to: i) farm, ii) rent-out, iii) maintain passively or iv) abandon their land given changes in various factors (principally land productivity, the level of payments and their conditions, and transaction costs). In a complementary empirical analysis we use the dynamic, agent-based AgriPoliS model (extended for the purpose) to study the effects of the possibility to choose passive farming on agricultural development and land use in a case-study region.

Conceptualizing land lock-in

According to the Federation of Swedish Farmers (LRF) lock-in occurs when agricultural land is not used for commodity production but is simply maintained to fulfil the minimum GAEC obligation for CAP support payments (LRF, 2009). Passive farming is perceived by LRF to be a problem because they believe rural development is best created through using agricultural land in production and not managing it passively (LRF, 2015). Other groups also speak of lock-in but without defining it, e.g., the Swedish Grain Growers Association (Sandberg,

2014). It is thus unclear whether these interest groups differentiate between passive farming and lock-in, or whether they are, in essence, referring to the same phenomena.

The term lock-in is also being used in government circles. According to the Swedish Board of Agriculture lock-in occurs when land is not made available for food production and is therefore lost as a production resource (SJV, 2015). Consequently, despite the decoupling reform representing a fundamental change in the basis for CAP support (and the underlying motivation being to eliminate food surpluses), it still seems widely viewed that agricultural land should be used for the production of traditional commodities, particularly milk and beef, and therefore utilized by active farmers rather than passive landowners (Svensson, 2012). Even at the governmental level there is concern that if farmland doesn't come out on the market it will slow structural change and hence impede development (Ds, 2014:6, p. 112), which of course is, ostensibly, true in the sense that land is a perquisite for agricultural expansion.

Despite the lack of clarity about the reasons for choosing passive farming, it is still claimed that lock-in is restricting agricultural development: "without access to more land, active farmers will not survive and therefore risk becoming passive themselves" (Björnsson, 2011). It is also feared that the ongoing convergence or equalization of payments across regions (as part of the 2015 CAP reform) will aggravate the perceived lock-in problem because payments in marginal areas will rise (Jordbruksverket, 2014, LRF, 2014).

The Swedish Board of Agriculture is though skeptical about whether lock-in exists. They argue that the choice of not using land in production (passive farming) is more likely related to low productivity and resulting poor profitability of marginal land rather than the SFP per se (Jordbruksverket, 2012). Consequently a disparity of opinion has arisen between interest groups and government about the causes of passive farming and whether the SFP is resulting in lock-in, i.e., landowners holding onto land that *otherwise* would be used in production. Is it a question of unreasonable landowners refusing to release their land, as farmers' organizations might lead us to believe, or is profitability so low that active farmers cannot meet rational landowners' minimal rental price?

The scientific literature on passive farming is thin and whilst the term lock-in is frequently used in Sweden it is not prevalent elsewhere, though equivalent reasoning can be found in at least the Netherlands and Belgium (Ander, 2012a). Most relevant research has focused on related issues, particularly capitalization of CAP support in land values (Ciaian et al., 2010) and the role of the SFP for preventing land abandonment (Renwick et al., 2013) but no mention of lock-in is made. The lack of studies is no doubt partly due to the relatively recent unfolding of the full implications of the decoupling reform for land use (Keenleyside and Tucker, 2010).

Other changes in support conditions could also be confounding the causes of land use change. For example in 2008 the minimum 10% set-aside requirement for farms over 70 ha was removed and has undoubtedly also influenced land-use dynamics. For instance the area of set-aside in 2005 in Sweden was 321K ha which fell to 153K ha in 2009 and grew again to 158K ha in 2013 (SCB, 2014). Change is also manifest in the large increase in the area of arable grass fodder (ley) at the expense of cereals, and simultaneous reduction in the number of ruminants, indicating a transition to more extensive land use (Trubins, 2013). Accordingly it is predicted that an ever increasing area of agricultural land in the EU will be managed by passive landowners over the coming decades (Keenleyside and Tucker, 2010).

In a scientific study, Andersson et al. (2011) find that most passive farming in Sweden occurs in marginal regions and on farms that have previously been relatively small, and making low profits and no investments. Trubins (2013) corroborates this picture by finding that agricultural production is concentrating to a greater degree in the most productive agricultural regions, whereas the least productive land in marginal regions is being managed by passive farmers. Further, virtually no land is being managed by passive farmers in the most productive agricultural regions in Sweden (SCB, 2014), which supports the contention that passive farming is due primarily to low productivity and poor profitability.

In summary, there exist disparate opinions about the effects of the SFP on agricultural land-use and the implications of passive farming for structural change and landscape preservation in the EU. Consequently there is a need to clarify which factors influence the level of passive farming and whether there is substance to the claimed lock-in problem, that land is not let out despite a willing renter. In particular the implications of interactions between agricultural policy, national regulations (e.g., those that regulate rental contracts), markets and land characteristics (e.g., soil fertility, field size, distance to fields, etc.) need to be studied.

Theoretical model: land-use decisions

We begin by developing a theoretical model of the land owner's land-use decision and identify factors that can influence the owner's decision to rent out their land. Whether the land is let or sold is of no consequence for the analysis (Ciaian et al., 2010, p. 187). Thereafter we analyze how these factors affect the owner's decision to manage the land themselves or let it out to someone else.

For simplicity the landowner can choose from four general types of land use:

1) use the land themselves to produce commodities (*Produce*)
2) manage the land without production to meet the minimal GAEC obligation (*Maintain*)
3) let out (rent) the land to an active farmer (lessee) who uses it to produce commodities (*Let-out*) or
4) abandon the land, which implies a land use outside the agricultural sector, e.g., forestry, (*Abandon*).

Both alternatives *Farm* and *Let-out* involve the land being used in commodity production. We also assume that the cost to *Maintain* the land without production is identical for both the landowner and lessee, hence there is no incentive for a potential lessee to rent the land to simply maintain it. The crucial action is whether the land is used in production, and not *who* manages it if it is only maintained. To determine which of the four possible land uses the owner would choose we assume that the owner aims to maximize their income. According to this assumption the land will be used in the way that generates the highest profit. The principal results and conclusions of the ensuing analysis will therefore be driven by how the profitability of each land-use alternative is affected by changes in economic and agronomic conditions. We also focus on land-use on the margin, i.e., how will the owner use a particular area of land the next coming year. This decision does not affect fixed costs (e.g., machinery), hence we only consider variable costs.

Land owner's profit from alternative land-uses

We begin by formulating expressions for the owner's potential profit, π, from choosing a particular agricultural land use: i) *Farm*, ii) *Maintain*, iii) or *Let-out.* If none of these uses are profitable then land use iv) *Abandon* is chosen (the default non-agricultural land use).

i) Farm

The owner's maximal potential profit (π^F) from farming their land themself in a system with coupled and decoupled policy payments is formulated as:

$$\pi^F = (p + s - c)Y - f(\theta) + SFP \tag{1}$$

where *Y* (kg/ha) is yield of agricultural product, *p* (€/kg) is the product's market price, *s* (€/kg) is a production subsidy or coupled payment, *c* (€/kg) is the cost of inputs that vary with yield (fertilizer, energy, chemicals, etc.), $f(\theta)$ (€/ha) is an increasing labour cost of farming an additional ha of land where θ ($\theta \geq 1$) is an index indicating how much extra labour is needed to farm the ha. Thus the higher θ the higher the cost of farming the land (or mathematically $df(\theta)/d\theta > 0$ and $df^2(\theta)/d\theta^2 \geq 0$). The term SFP (€/ha) or Single Farm Payment is a payment decoupled from production because farming the land is assumed to meet the minimum GAEC obligation.

Proposition 1: The owner will only choose *Farm* if it is profitable to do so, i.e., $\pi^F > 0$.

ii) Maintain

If the land is not profitable for the owner to farm ($\pi^F < 0$) they could instead choose to *Maintain* it, since they would still be eligible for the SFP if they meet the minimum GAEC obligation. The potential profit from maintaining the land, π^M, is

$$\pi^M = SFP - MAIN(\theta) \tag{2}$$

where $MAIN(\theta)$ (€/ha) is the cost of meeting the minimum GAEC obligation for the SFP without farming it. Since the labour cost of maintaining the land is likely to be affected by its geographical characteristics we express it, as with the costs of field operations above, as a function of θ (such that $dMAIN(\theta)/d\theta > 0$ and $dMAIN^2(\theta)/d\theta^2 \geq 0$).

Proposition 2: The owner will only choose *Maintain* if it is profitable to do so, i.e., $\pi^M > 0$.

iii) Let-out

The owner could also choose to *Let-out* their land. The potential profit from letting out will depend on the potential lessee's willingness-to-pay to rent the land and any costs (implicit or explicit) associated with the transaction. Although the rental price *R* will result from negotiations in practice and hence be influenced by bargaining power, it is not necessary to derive an exact price here (however the process is modelled through an auction in the empirical analysis). Instead it is sufficient to note that the rental price will be bounded by the potential lessee's maximum willingness-to-pay to rent the land, R^{max}, and the minimum rental price the owner would be willing to accept, R^{min}.

The potential lessee will only be willing to rent the land if it is profitable for them to farm it (since the lessee is also assumed to maximize profit). By farming the land the lessee will also be the person entitled to claim policy payments (according to CAP regulations). Given all sources of income the maximum rental price the lessee would be willing to pay is

$$R^{\max} = \left(p + s - c^{L} \right) Y - f\left(\theta^{L} \right) + SFP \tag{3}$$

where c^L is the lessee's variable production costs and $f(\theta^L)$ is labour cost related to field-operations. If the lessee's costs for farming the land $c^L Y + f(\theta^L)$ are lower than the owner's, then they could farm the land more profitably. On the other hand the lessee's maximum willingness to pay will decline as the costs of farming the land increase, e.g., due to increasing distance from their farm.

Proposition 3: The potential lessee will only rent the land if the rental price, *R*, is lower than their maximum payable price, i.e., $R < R^{max}$.

The land owner will only be willing to let-out their land if it is profitable for them to do so. Letting land though involves risk: Will the lessee pay the rent as agreed and on time? Will the lessee be difficult in negotiations? Will they farm the land sustainably? etc. Further, regulations controlling rental agreements might impose implicit costs on the owner by attenuating their property rights. We refer to these risks or losses in welfare as *transaction costs* which are valued as the minimum compensation that would make the owner indifferent to exposing themself to these and are denoted *TRC* (€/ha). For simplicity we assume that all transaction costs are born by the owner. Thus the minimal rental price the owner would be willing to accept is

$$R^{\min} = \pi^{M} + TRC. \tag{4}$$

Proposition 4: The owner will only *Let-out* their land if the rental price, *R*, is higher than their minimal acceptable price, i.e., $R > R^{min}$.

Based on Propositions 3 and 4 we can now define a rental price that would be acceptable to both parties and hence result in a rental agreement.

Proposition 5: A rental agreement will only be possible if the rental price lies within the interval $R^{max} < R < R^{min}$.

iv) Abandon

Proposition 6: The owner will *Abandon* the land if none of the agricultural land uses are profitable, i.e., if π^F, π^M and $R < 0$.

Land-owner's optimal land use

By our assumption of income maximization the farmer will choose the land use that generates the highest profit. Accordingly, and based on Propositions 1-6 the following rules will lead the land-owner to reaching their goal:

Rule (i) Farm the land if: $\pi^F > 0$; and $\pi^F > \pi^M$ and $\pi^F > R\text{-}TRC$.

Rule (ii) Let-out the land if: $\pi^F < R\text{-}TRC$; and $R > R^{min}$ and $R > \pi^M$.

Rule (iii) Maintain the land if: $\pi^M > R\text{-}TRC;$ and $\pi^M > 0$ and $\pi^M > \pi^F$.

Rule (iv) Otherwise Abandon the land.

Definition of locked in land

Choosing *Maintain* would qualify as locking in land, according to agricultural interest groups, if there is an active farmer who makes an offer to rent the land (i.e., their willingness-to-pay $R^{max} > 0$), but which is rejected by the owner because the bid is below their acceptable rental price, meaning $R^{max} < R^{min}$. This definition accommodates the situation where an active farmer is willing to farm the land (provided the rental price is low enough), but can be denied access to the land; because the rent bid is below the owners minimum acceptable rent R^{min}. Hence the owner could be perceived by the potential lessee as blocking their expansion ambitions by not releasing the land. Further it implies that in the absence of a willing lessee the land would not be considered locked in, which also accommodates common perception.

Empirical analysis with AgriPoliS simulations

In this section we use the agent-based AgriPoliS model (Balmann, 1997, Happe et al., 2006, Kellermann et al., 2008) to analyze how the extent of passive farming responds to changes in different factors. AgriPoliS is well suited to the task because it simulates farmers' competition for land through an endogenous land-rental auction as well as being spatial and dynamic. To achieve our aims we calibrated a new region in AgriPoliS where passive farming has been observed, the Swedish mixed farming region known as Götalands mellanbygder or GMB (Brady et al., 2015, Appendix A). Agriculture in GMB is also diverse ranging from specialized arable cropping to dairy farming and extensive meat production, which is reflective of the relatively large variation in land productivity.

Differences in land productivity which we characterized as potential yield (Y) and labour costs (θ) in the theoretical model are captured in AgriPoliS through heterogeneous land quality (three classes of arable land plus meadow or semi-natural grassland) and landscape characteristics (field size and the spatial distribution of fields). We do not analyse the impacts of changes in market prices because these are largely beyond the control of policymakers in today's EU. Those factors we are left to test in AgriPoliS are thus the SFP, minimum GAEC conditions and transaction costs.

Simulation results: quantification of factors that can influence passive farming

Simulated scenarios

We created four hypothetical scenarios to test how much the current area of passively farmed land is affected by the different factors and simulated agricultural development under the different scenarios to 2020. The period 2011-14 in each simulation reproduces the observed development and level of passive farming over this period. A reference scenario (**REF**) simulates development in GMB until 2020 with continuation of current conditions. By comparing simulation results from different scenarios with those from **REF** we could discern the impact of a specific scenario on the level of passive farming. The scenarios we investigated are:

I. Increase the Single Farm Payment by 20% (**SFP_HGH**).
II. Reduce the Single Farm Payment by 20% (**SFP_LOW**).
III. Impose stricter land management requirement as an increase in the cost of meeting the minimum GAEC obligation by 150 SEK/ha, but with unchanged costs of achieving it through production (**GAEC**).
IV. Mimic higher transaction costs by increasing the minimum rental price a land owner would be willing to accept by 150 SEK/ha (**TRANS**).

In the simulations the farm-agents (land owners) have complete freedom to choose the land use that maximizes their income, i.e., a) farm the land themselves to produce commodities, b) let out the land to another farm-agent, c) manage all or part of their land area passively or d) abandon the land. A farm-agent is classified as a passive farmer if 95% or more of their farm area is managed passively. If a farm-agent chooses to close down their farm then their land is released to the land auction market and will be let out if another farm agent is willing to rent it, otherwise it is assumed to be abandoned.

Effects on farm structure and land-rental prices

Since the pace of structural change and the extent of passive farming in a system with decoupled support are closely related we begin by presenting the effects of the different scenarios on farm structure in terms of a) the relative change in the number of farms and b) average farm size in GMB in 2020 compared to the base year, 2011. The simulations show that relatively rapid structural change would occur as a result of continuing the current CAP under present market conditions, see **REF-**scenario in Figure 1. In particular many of the small farms we model close down.

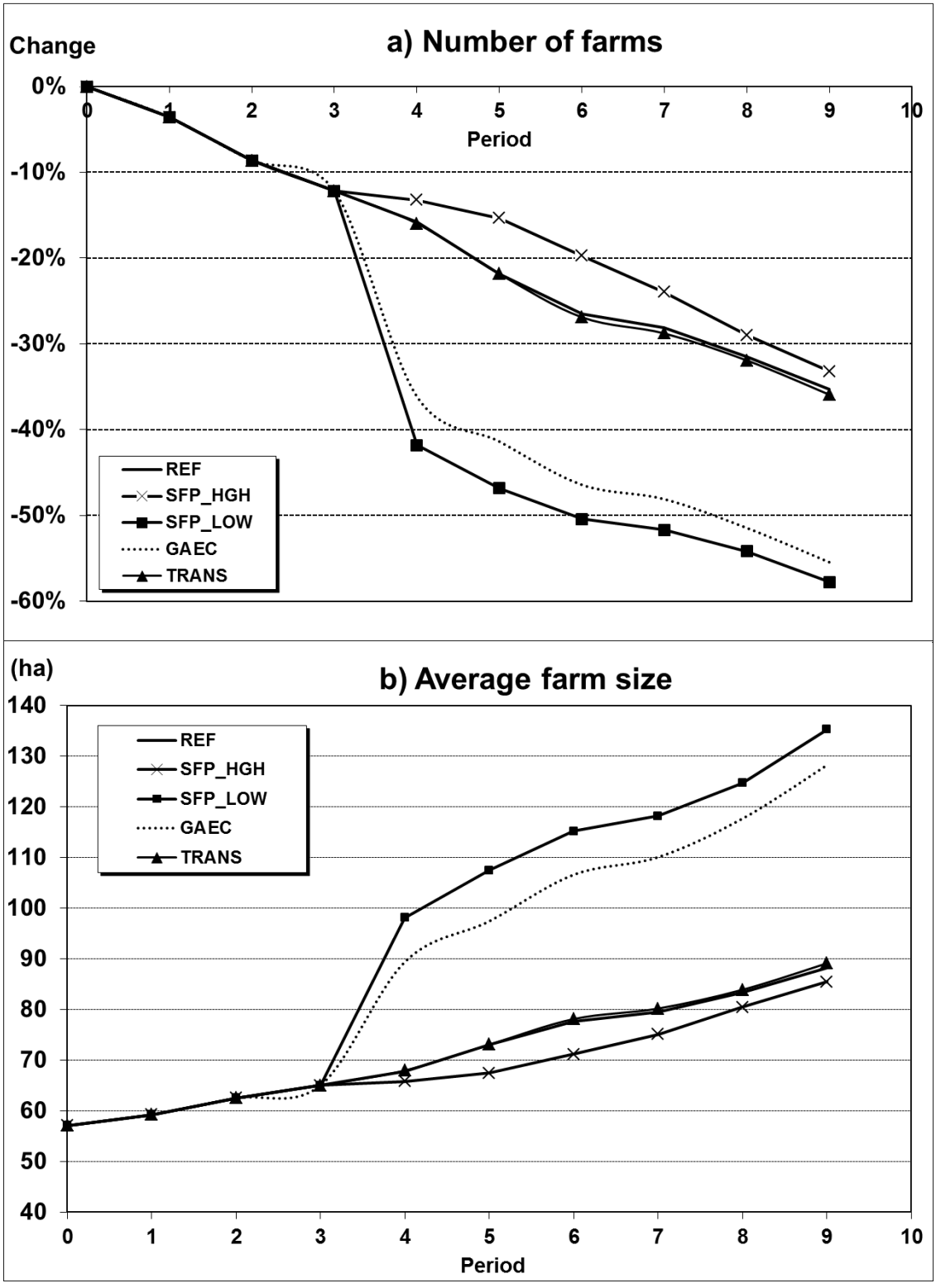

Figure 1. Effects of the different policy scenarios on structural change. NB: The **REF**-scenario is difficult to see because it is shadowed by the **TRANS**-scenario.

Increasing the current Single Farm Payment (**SFP_HGH**) slows structural change and the growth in farm size compared to **REF**. Reducing the payment (**SFP_LOW**) has stronger affects: most passive farmers and small active farms close down because they no longer can cover their opportunity costs of own labour and capital as a result of lower revenues. Consequently there is a rapid increase in the average size of remaining farms (Figure 1b). A

stricter minimum management obligation (**GAEC**) accelerates structural change whereas higher transaction costs (**TRANS**) have no effect compared to **REF**. Higher transaction costs do not affect farm agents' strategic decision to maintain their own land or close down the farm and release their land to the rental market, because the cost to themselves of maintaining their land is unchanged. Their minimum acceptable rental price however increases to reflect the additional compensation required to cover the higher transaction costs. On the other hand an increase in the land owners' transaction costs doesn't affect a potential lessee's willingness to pay to rent the land. Consequently rental prices are hardly affected by the **TRANS**-scenario compared to **REF** (Figure 2).

As expected rental prices and therefore capitalisation of payments increases with an increase in the SFP. The reverse occurs if the payment is reduced which we also expect according to the theoretical model. The lessee is compensated for lower payments by a reduction in the rental price. These developments imply that the single farm payment has, to some extent, capitalised into rental prices in GMB. Hence an increase in the current single farm payment in GMB would lead to higher rental and land prices for active farmers hoping to expand their farms or for young farmers or other persons wishing to start farming, which diminishes the income effect of the single farm payment scheme for these farmers.

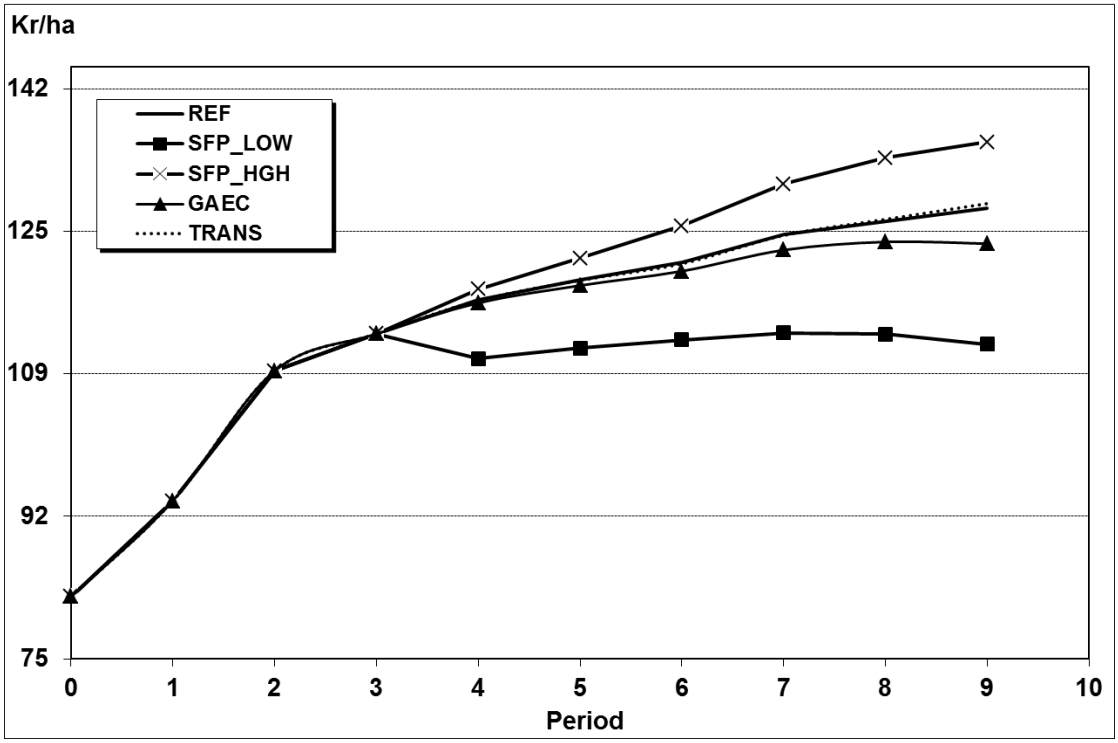

Figure 2. Development of rental price for low-productive arable land

Effects on the extent of passive farming and land lock-in

The area of arable land maintained by passive farmers is strongly influenced by the simulated policy scenarios (Figure 3). Figure 3a shows the change in the area of land maintained by passive farmers in 2020 compared to the base year for the different scenarios. This area comprises principally fallow on low-productive arable land. According to the **REF**-scenario the area of passively managed land will increase over time with continuation of the current policy. This is because the profitability of food production (given unchanged market conditions) is too low to motivate new investments in machinery and stables when it's time to

reinvest. Rather it is most profitable for these farms to maintain their land according to the minimum management obligation which implies that they also become passive farmers since the whole farm area is fallowed.

Increasing the single farm payment has no effect on the extent of passive farming compared with **REF.** Land that is currently managed passively simply becomes more profitable to manage passively and the rental price for land that is used in production increases thus eliminating the incentive to manage more land passively (see development of the rental price in Figure 2 above).

A higher rental price reduces the probability that land will be managed passively because it becomes relatively more profitable to let it out to an active farmer. In other words the extent of passive farming would not be affected by an increase in the SFP, ceteris paribus, because the relative profitability of using the land in production or maintaining it passively remains unchanged (recall the relevant results from the theoretical analysis where it is shown that the land owners minimum acceptable rental price and the potential lessee's maximum price rise symmetrically).

The **GAEC** and **SFP_LOW** scenarios show that the extent of passive farming is affected by stricter management obligations or reduced payments (Figure 3a). The entire area of passively farmed land disappears in both scenarios because it is no longer most profitable for passive farmers to maintain their own land. Furthermore Figure 3b shows that even the area of fallow land managed by active farmers is affected by these scenarios. Compared to the **REF**-scenario a stricter management obligation or reduced payment results in a larger area of fallow on active farms. This implies that measures to reduce the incidence of passive farming will even have negative effects on active farmers because their incomes at the farm level, all other things equal, will decline since the costs of maintaining land that is put in fallow increase and support payments are lower.

According to the theoretical model, higher transaction costs should lead to more passive farming. The **TRANS**-scenario shows that the extent of passive farming in GMB is sensitive to transaction costs associated with letting land; the higher the transaction costs the higher the rental price required by the landowner to let out their land. The simulated rental prices for the low-productive arable land in GMB, which is primarily used in dairy and beef production today, are relatively low (Figure 2 above). Consequently the extent of passive farming is likely to be sensitive to factors that raise transaction costs.

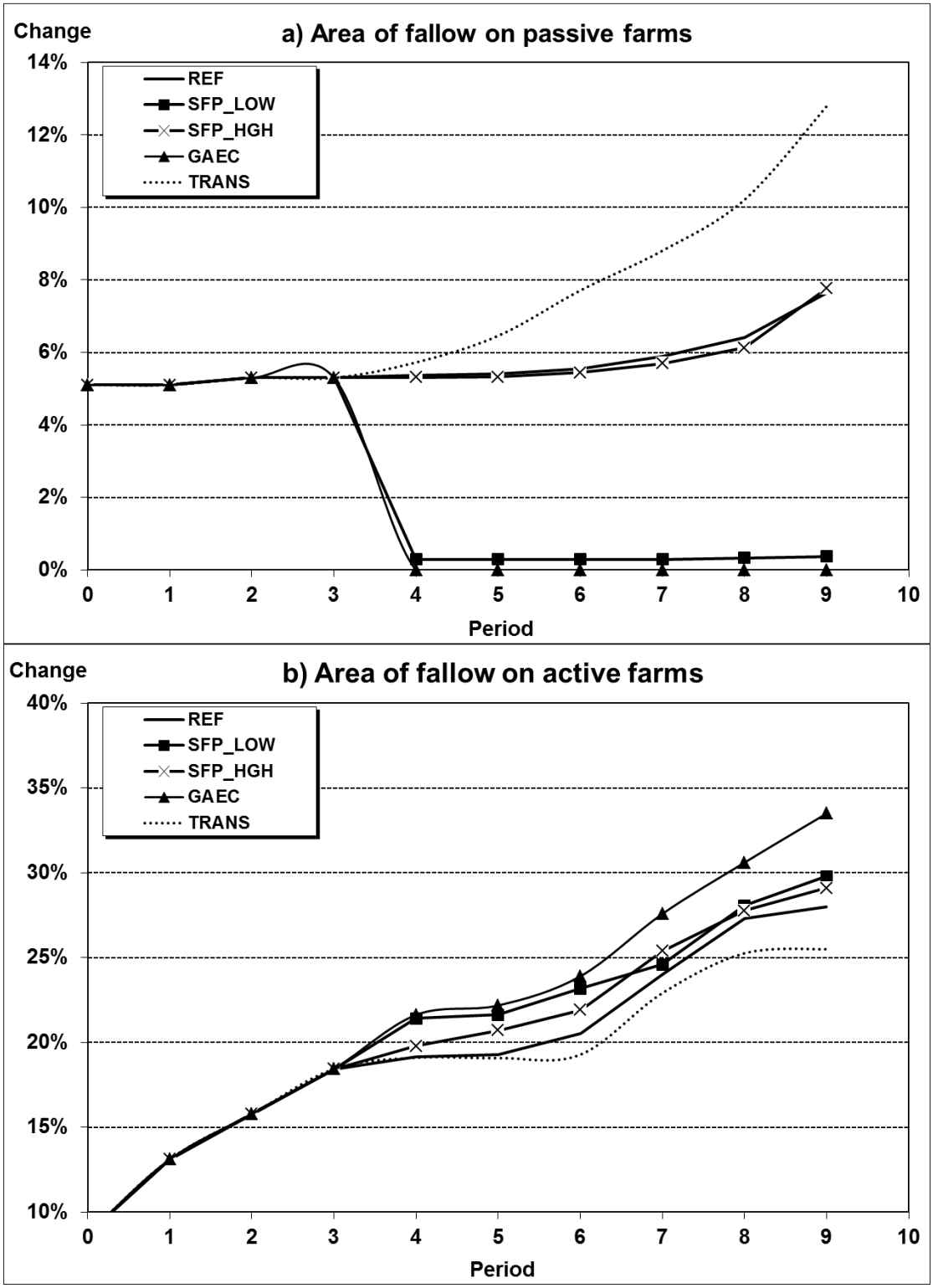

Figure 3. Changes in the areas of fallow land managed by a) passive farmers and b) active farmers.

To better understand how the different scenarios affected land-use in GMB we show in Figure 4 developments in land use to 2020. To do this we have classified land-use according to the following categories:

1) **Crops** is the area of annual cash crops (i.e., grains, oilseed and sugar beets).
2) **Silage** is the area of grass silage produced on arable land.
3) **Pasture** is the area of grass on arable land that is used for grazing**.**
4) **Tot.Fallow** is the total area of fallowed arable land that is managed according to the minimum GAEC obligation for support that is managed by both passive and active farmers where:
    a. **Act.Fallow** is the area of fallow managed by active farmers.
    b. **Pass.Fallow** is the area of fallow managed by passive farmers.
5) **Meadow** is the area of semi-natural grassland.

Figure 4 shows that the different scenarios primarily affect the allocation of land between fallow and pasture, i.e. the most extensive use of arable land for fodder production. It also affects the distribution of fallow land between active and passive farmers. A stricter minimum management obligation results in the elimination of passive farms but simultaneously leads to an increase in the area of fallow on active farms. This implies that the total area of arable land that is managed to meet the minimum GAEC obligation for payments doesn't decline to the same extent as the reduction in the area previously managed by passive farms.

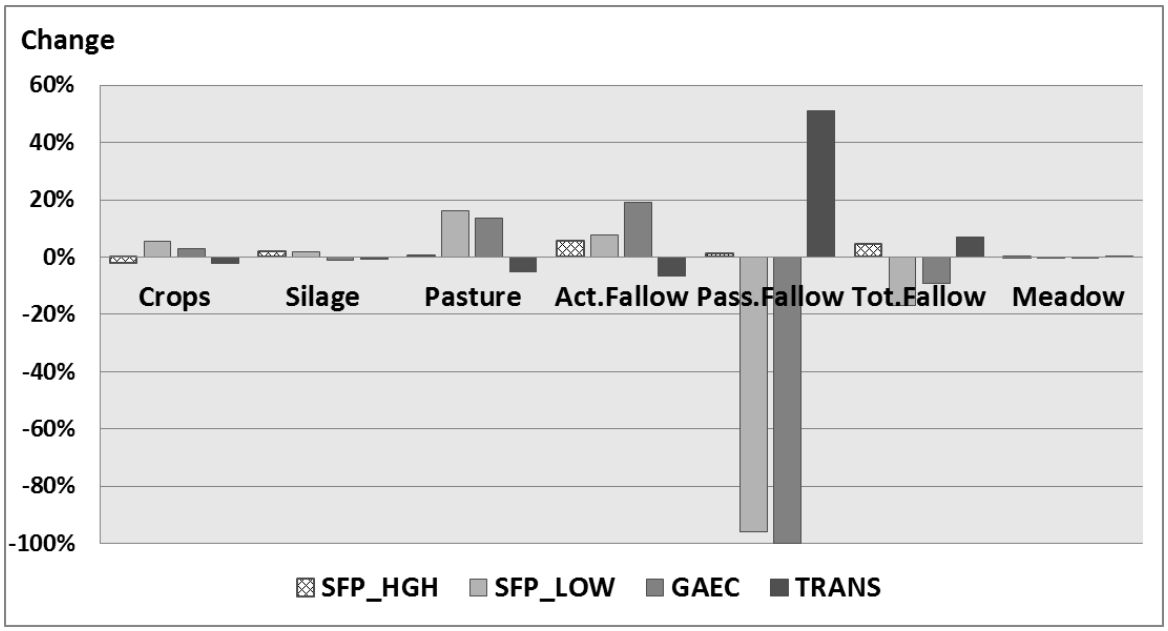

Figure 4. Changes in land use compared with the reference scenario (REF) in 2020.

Increasing payments (**SFP_HGH**) provides even active farmers with higher incomes and therefore more farmers choose to continue with farming than otherwise, i.e., the **REF**-scenario (Figure 1 above). Concomitantly, the maximum rent that potential lessees (i.e., active farmers) would be willing to pay also increased compared to **REF** (Figure 2 above). Consequently the number of passive farmers does not increase with the simulated increase in the current SFP (all other things equal).

Reducing the SFP resulted in the elimination of all passive farms. Since these farmers are also assumed to maximize family income they close down their farms if the profits from

passive farming become too low. Even the demand for land on the rental market declines which is reflected in lower rental prices (Figure 2). Hence, instead of more land being used in production the simulations show that even the area used in production by active farmers declines (**Tot.Fallow** increases in **SFP_HGH** in Figure 4). Consequently reducing the single farm payment not only counteracts the extent of passive farming, but also reduces the area of land used in production by active farmers. This will in turn increase the probability that land is abandoned because it is less profitable to maintain it.

Discussion and conclusions

The decoupling of direct payments in 2005 and simultaneous removal of the ceiling on the area of set-aside paved the way for the development of passive farming and potential land lock-in. Our analysis shows though that decoupled support is not the cause of lock-in: according to the goals for the Single Farm Payment (SFP) scheme production should only occur if it is profitable to do so at market prices or is the most cost efficient way to meet the associated minimum land management obligation. However land that is only maintained to meet the minimum management obligation is perceived as a problem by sectoral interests. For example in Sweden the National Federation of Farmers has the view that agricultural land should be used in food production as far as possible. From this perspective a perceived land lock-in can occur if production would be profitable including the SFP. The perceived lock-in problem occurs in such case as a result of the active farmer (potential lessee) offering a lower rental price than the land owner is willing to accept to release their land. This however is a business related problem and not a policy related problem.

With the introduction of the single farm payment scheme most production subsidies were replaced with decoupled payments. A consequence of this change is that a lessee's maximum willingness to pay to rent a piece of land can have fallen while the landowner's minimum acceptable rental price can have increased. This explains the somewhat paradoxical situation experienced today that landowners demand a higher rental price then a potential lessee can motivate solely from the profitability of production, since the land is not sufficiently profitable to produce food given current market prices. On the other hand it is profitable for the landowner to maintain the land in good agricultural and environmental condition thanks to the SFP. In this respect the SFP scheme achieves its goal of avoiding the abandonment of land that is not profitable for food production.

The results from AgriPoliS simulations support the conclusions from the theoretical analysis that land owners decisions to choose passive farming instead of letting out their land depends on the potential lessee's willingness to pay, which in turn is dependent on the potential profitability of production, rather than the SFP per se. Consequently there is more land in production in our study region (a marginal region) than otherwise would be the case because production is the most cost-effective way to meet the minimum land management obligation for certain fields. This also implies that an increase in the SFP would not result in an increase in the extent of passive farming. This is because the profit from production and the costs of meeting the management obligation remain unaffected by an increase in the payment level. Rather, and in accordance with the theoretical model, an asymmetric increase occurs in both the land owner's minimum acceptable rental price and the potential lessee's maximum payable price. Consequently the area of land that is rented out is not affected. If stricter management obligations would even increase the costs of production it could have the opposite effect, i.e., that less land is used in production and a larger area risks being

abandoned. The SFP and and associated GAEC condition must therefore be carefully balanced to achieve the desired effects on production and maintaining the landscape.

The dynamic analysis with AgriPoliS confirms that that the perceived problems with land lock-in depend primarily on land that is not profitable to use in food production but instead is maintained by passive farmers. That land owners maintain their land in good agricultural and environmental condition is an obligation of the SFP scheme, partly to maintain open agricultural landscapes and partly to keep land in reserve for potential future need (but land that is not needed today). Thus land can be perceived as being locked in, while in practice the lack of active production on the land is a consequence of poor profitability and the resultant inability of a potential lessee to meet the landowners minimum rental price.

A number of factors have been analysed that could affect the extent of passive farming and potential locking in of land. A stricter management obligation or reducing the payment level should result in a reduction in the extent of passive farming. However these measures will also have negative effects on active farmers. First farm incomes would decline. Second many active farmers also have land in fallow (i.e., maintain it without any production to meet the minimum management obligation). Consequently a stricter management obligation would lead to higher costs for many active farmers. There seems therefore an unavoidable trade-off between the policy goals of supporting farmers' incomes and maintaining the agricultural landscape, and the farming sector's desire to reduce the extent of passive farming.

There is even concern that the convergence or equalization of single farm payments in 2015 will raise the level of passive farming due to the resultant increase in payment levels in marginal regions. According to our analysis the number of passive farmers will not rise as a result, because lessees' willingness to pay to rent land (that is currently rented) will also increase and by the same amount as the increase in the payment. The lessee's maximum payable rental price and the landowners minimum acceptable price should, in other words, move in the same direction: a one Euro increase in the SFP will raise the landowners minimum acceptable rent and the lessee's maximum payable rent by one Euro respectively. In highly productive regions such as the Scanian plains in Sweden, the SFP has little effect on land-use since crop production is profitable at current market prices. Consequently reducing the SFP in such regions should only result in lower land and rental prices. The convergence of payments (all other things equal) should therefore not affect land use but rather the degree to which support is capitalized in land values.

High transaction costs could explain perceived land lock-in: the landowner who "refuses" to let out their land despite a willing lessee's, as it might appear, reasonable rental offer. The potential lessee and other outsiders could though easily underestimate the landowners costs associated with letting out their land since their transaction costs are only known to them. Our simulations show that transaction costs don't affect the landowners decision to continue farming or not (either passive or active) but influence their willingness to let out their land compared to maintaining it themselves. The area of passively farmed land increased in our simulations with a small increase in transaction costs (given unchanged payment levels and GAEC obligations). Therefore landowners' rental price demand will be sensitive to factors that increase transaction costs.

A Weak GAEC obligation is also a possible cause of lock-in. Since the management obligation influences land-use, principally in marginal regions, it is important that they reflect the goals of agricultural policy. If they are too weak it implies the land will not be maintained in a state that corresponds to expectations from society and therefore could result in land lock

in (i.e. that less land is let out than is optimal). On the other if the GAEC obligation is set to high, too much land will be used in production than is optimal, whilst unprofitable land will be abandoned.

In line with current knowledge, our dynamic simulations show that the SFP scheme has a strong effect on structural change: higher payment levels slow change (more farmers remain in the sector and the possibility for other farms to expand is restricted), whereas lower payments speed it up (more farmers leave the sector and remaining farms can grow faster). The level of the SFP and associated GAEC obligation need therefore to be carefully balanced to minimise the negative effects on competitiveness that a slower rate of structural change would have. On the other hand arbitrarily low payments or strict management obligations bring with them the risk that land will be abandoned in marginal regions. An optimal balance between payment levels and management obligations is therefore necessary to achieve policy goals.

References

Ander, G. (2012a), "Inlåsningen drabbar bönder över hela EU. Available from: http://www.lantbruk.com/lantbruk/inlasningen-drabbar-bonder-over-hela-eu. [Accessed 30 January, 2015]." *Land Lantbruk*, 2012-09-13.

Ander, G. (2012b), "Kampen mot smörberget skapade soffbönderna." *Land Lantbruk*, 14 september 2012.

Andersson, H., Å. Andersson, L. Ehde, G. Eskhult, G. Jansson, E. Johansson and C. Nilsson (2011), *Passiva lantbrukare – en effekt av EU:s jordbrukspolitik. En studie av ett antal faktorers påverkan på svenska passiva lantbrukares attityder till markanvändning och EU:s jordbrukspolitik.* Examensarbete, Inst. för ekonomi, SLU. [http://stud.epsilon.slu.se/3195/4/andersson_h_etal_110907.pdf]

Balmann, A. (1997). "Farm-based modelling of regional structural change: a cellular automata approach." *European Review of Agricultural Economics*, 24: 85-108.

Björnsson, S. (2011). "Gör marken tillgänglig för aktiva bönder." Stockholm: Svensk mjölk.

Brady, M., J. Hristov, C. Sahrbacher and F. Willhelmsson (2015). "Passivt jordbruk: inlåsning av mark eller bevarande av öppna landskap?" *Working Paper 2015:3* Lund: AgriFood Economics Centre [http://www.agrifood.se/publication.aspx?fKeyID=1823].

Brady, M., C. Sahrbacher, K. Kellermann and K. Happe (2012). "An agent-based approach to modeling impacts of agricultural policy on land use, biodiversity and ecosystem services." *Landscape Ecology*, 27(9): 1363-1381.

Ciaian, P., d. A. Kancs and J. F. M. Swinnen (2010). *EU Land Markets and the Common Agricultural Policy,* Brussels: Centre for European Policy Studies (CEPS).

Ds (2014:6). "Gårdsstödet 2015-2020." Stockholm: Landsbygdsdepartementet.

Happe, K., K. Kellermann and A. Balmann (2006). "Agent-based Analysis of Agricultural Policies: an Illustration of the Agricultural Policy Simulator AgriPoliS, its Adaptation and Behavior." *Ecology and Society*, 11(1): 49. [http //www.ecologyandsociety.org/vol11/iss41/art49/].

Jordbruksverket (2012). "Vilka faktorer bestämmer priset på jordbruksmark?" Jönköping: Jordbruksverket.

Jordbruksverket (2014). "Remissvar DS 2014:6 – Gårdsstödet 2015-2020." Jönköping: Jorbruksverket. Available: http://www.jordbruksverket.se/download/18.37e9ac46144f41921cd7567/1397210911391/Remissvar+DS+1+6.pdf. [5 February, 2015].

Keenleyside, C. and G. M. Tucker (2010). "Farmland Abandonment in the EU: an Assessment of Trends and Prospects." London: Report prepared for WWF. Institute for European Environmental Policy (IEEP).

Kellermann, K., K. Happe, C. Sahrbacher, A. Balmann, M. Brady, H. Schnicke and A. Osuch (2008). "AgriPoliS 2.1 - Model Documentation." Halle (Germany): IAMO [http://www.agripolis.de/documentation/agripolis_v2-1.pdf]. [Accessed 06/10/17].

LRF (2009). *Den framtida jordbrukspolitiken,* Stockholm: Lantbrukarnas riksförbund.

LRF (2014). "Angående regeringens förslag om tillämpningen av CAP." Höör: Lantbrukarnas Riksförbund Skåne. Available: http://www.lrf.se/globalassets/dokument/mitt-lrf/regioner/skane/remisser-skrivelser-och-motioner/skrivelse_cap_slutgiltig.pdf. [5 February, 2015].

LRF (2015), *Svenskt lantbruk omfattas av EUs jordbrukspolitik* [Online]. Stockholm (http://www.lrf.se/politikochpaverkan/jordbruks--och-handelspolitik/cap/) [Åtkomst 20150424]: Lantbrukarnas Riksförbund.

Renwick, A., T. Jansson, P. H. Verburg, C. Revoredo-Giha, W. Britz, A. Gochte and D. McCracken (2013). "Policy reform and agricultural land abandonment in the EU." *Land Use Policy*, 30: 446-457.

Rioufol, V. (2011). "Lifting the land barrier: The indispensable step towards developing local, sustainable, civic agriculture in Europe." Available from: http://www.landco.nl/uploads/position%20paper%20land%20Terre%20de%20Liens%20en%20anderen.pdf. [Accessed 2015-01-25]: Terre de Liens & Forum Synergie

Sandberg, P. (2014), "Gårdsstödet ett bra skördeskadeskydd." *Synpunkten. ATL, Landbrukets Affärstidning*, 2014-05-14.

SCB (2014). "Jordbrukstatistik årsbok 2014 (Yearbook of agricultural statistics 2014)." Örebro: Statistics Sweden.

SJV (2015). "Jordbrukspolitik, inlåsning och strukturomvandling." Jönköping: Jordbruksverket.

Svensson, H. (2012), "Produktionen av kött och mjölk måste öka." *Synpunkten. ATL, Landbrukets Affärstidning*, 2014-12-19.

Trubins, R. (2013). "Land-use change in southern Sweden: Before and after decoupling." *Land Use Policy*, 33(0): 161-169.

Wahlberg, C. (2014), "Höj kraven för att gynna aktiva lantbrukare." *Jordbruksaktuellt*, 2014-04-16.

Vernersson, L. (2012), "Gårdsstödet får allvarliga bieffekter." *ATL, Landbrukets Affärstidning*, 2012-06-18.