Impact of post-2013 CAP reform on land markets: evidence from farm surveys and farm-level modelling

Davide Viaggi\textsuperscript{1}
Fabio Bartolini\textsuperscript{2}
Marco Puddu\textsuperscript{1}
Meri Raggi\textsuperscript{3}

\textsuperscript{1}University of Bologna, Department of Agricultural Sciences, Bologna, Italy
\textsuperscript{2}University of Pisa, Department of Agriculture, Food and Environmental, Pisa, Italy
\textsuperscript{3}University of Bologna, Department of Statistics, Bologna, Italy

davide.viaggi@unibo.it; fbartolini@agr.unipi.it; marco.puddu@unibo.it; meri.raggi@unibo.it
Impact of post-2013 CAP reform on land markets: evidence from farm surveys and farm-level modelling

Viaggi D., Bartolini F., Puddu M., Raggi M.

Abstract
The connection between policy and other context variables and land markets is at the core of the policy debate, including the present reform of the Common Agricultural Policy. The objective of this paper is to evaluate the impact of the post 2013 CAP policy instruments on the land market in the Province of Bologna (Italy), based on a combination of survey and modelling information. Attention is particularly focused on the regionalization of payments and considers both potential reactions by individual farms and their interaction on the market. Modelling and survey information show a reaction of the land demand to the shift from the historical to the regionalised payments, with opposite reactions by different farms, hence incentives to adaptation through land markets exchange (rent). The regionalized payment seems to be more capitalized into the land value, at the margin, as long as it is less connected to entitlement. As a result, the regionalisation would cause increased rental prices. Survey information, however also reveals a major uncertainty by farmers in interpreting and devising an appropriate reaction to the expected reform.

Introduction

The connection between policy and other context variables and land markets is at the core of the policy debate, including the present reform of the Common Agricultural Policy. The agricultural economic literature has highlighted the effects of the CAP (Common Agricultural Policy) on factor markets (Floyd, 1965; Parsch et al. 1998; Latruffe et al., 2006; Ciaian et al. 2006; Bartolini et al., 2011) and, specifically, it has studied the way in which the CAP reforms have changed such effects over time. The first works that analyse the direct effect of policy on land demand and, in particular, the effect of agricultural price supports on the factor returns and on the personal distribution of income, is the paper by Floyd (1965). Many Authors, in later papers, show a close relationship between the effects of policy on the supply of production factors and their elasticity, as well as with their factor substitution possibilities (Parsch et al. 1998; Goodwin et al. 2005; Latruffe et al., 2006). Several works aim to estimate the effect of policy payments in terms of their capitalization into land value or land rental prices, and to calculate a share of capitalization depending on type of policy support (Ciaian et al. 2006; Dziemianowicz et al. 2008; Courleux, 2008; Latruffe et al. 2009). The literature also underlines the effect of policy change on the reallocation of productive factors over time (Bartolini et al., 2011). Several papers in particular analyse the effects of decoupling, introduced in 2003 by the Fischler reform, on the dynamics of exchange of land. These works identify the determinants of capitalisation of payments into land prices, including the distribution of payments between beneficiaries, in connection to the possibility of exchange of entitlements and in relation with the ratio between eligible area and number of entitlements own (Le Mouel, 2004; Kilian et al.,
2008; Courleux et al., 2008; Zier et al., 2010; Viaggi et al., 2010). Studies focusing on the effect of different policy scenarios on the changes of the land demand or land rented/sold are often derived or are expressed by changes in the marginal value of land. Mathematical programming models have been used to simulate the impact of policy reforms also considering changes in farm size under different price, policy, and cost scenarios (see Zimmerman et al., 2009 for a review of relevant models applied to structural change). This typology of models have also an important use to analyse competition for land allocation between different farms, measuring the effects of drivers of changes through the marginal value of land (Galko et al. 2011).

Some studies aims to investigate farmers’ investment behaviour (including land), and evaluate the impact of different CAP scenarios, with special focus on the Single Payment Scheme, in order to contributing to the understanding of the relation between policy objectives and farmers’ behaviour (Gallerani et al., 2008; Viaggi et al., 2011).

Several papers also show the use of econometric models based on the application of statistical and mathematical methods to address the effects of changes in policy mechanisms or property rights system on the amount of land markets transactions (Parsch et al. 1998; Latruffe et al. 2006; Gallerani et al. 2007; Ciaian et al. 2008; Jin et al. 2011). In other cases the analysis rests on surveys of intentions for example to investigate farmers’ decisions on land idling in a 2003 CAP reform scenario (Bougherara and Latruffe, 2010) or to identify the determinants of intended changes in farm size under two different CAP scenarios: Health Check and the complete abolition of CAP payments (Bartolini and Viaggi 2013). Others use data from a survey of farmers’ intentions to explain changes in farm activities mix, in intensity of production, in amount of labour employed, and in amount of idle land, as consequence of CAP 2003 reform (Tranter et al. 2007). Transaction cost in land exchange and imperfection of the land markets, such as imperfect competition, can be very significant in Central and Eastern European Countries CEECs and the combination of imperfect competition and transaction costs has a strong impact on land prices (Swinnen, 1999; Ciaian et al., 2007).

Given the complexity of factors affecting land markets and the impact of policy, ex-ante estimation of the impacts of policy changes remains always difficult. In this respect survey-based stated intentions and modelling-based simulation may yield different but complementary results (Viaggi et al., 2011).

The objective if this paper is to evaluate the impact of the post 2013 CAP policy instruments on the land market in the Province of Bologna (Italy). Attention is particularly focused on the regionalization of payments. To this aim, this paper joins insights from a survey carried out in the province of Bologna (Italy) in order to understand the effect of the reform through stated intentions by the farmers (Raggi et al., 2013) and a modelling simulation exercise carried out in the same province. The modelling component builds on a previous paper (Puddu et al., 2012), which farm household investment model has been revised and extended in order to simulate the demand curve for land by individual farms in different policy scenarios.
From the practical side, the paper aims to contribute an ex-ante understanding of the potential effects of the reform on the land values and propensity to transaction, focusing on regionalised payment introduction. From the methodological point of view, the paper aims to explore different ways to integrate very detailed farm level investment model output and survey information in more simplified farm models suitable to provide regional simulations concerning land markets.

In the next section we first recall the main features of the post 2013 CAP reform. In section 3 we describe the methodology and in section 4 the results. Section 5 provides a discussion, followed by some concluding remarks in section 6

**The direct payment in the post 2013 CAP reform**

The CAP is facing a new reform process. During October 2011 the official proposal of post-2013 reforms has been published (COM(2011)625/3). In Italy, reform will mainly determine the switch of the payment regime from an historical to a regional basis. The regionalized payment is a homogenous area payment for farms located in same region. The regionalized payment introduction will determine abolishment of calculation of the payment based on historical amount of payment received during reference period (2000-2002) and also, the entitlements owned by the farmers. Then regionalised payments are then determined, multiplying current operated times homogeneous value per hectare. The mechanism of payment will be based on disentangling of the single farm payment into four different components: basic payments; greening component; payments to the less favoured areas and payments to young and small farms. The basic payments will be assigned to active farmers. These limitations do not apply to farmers that receive less than 5000 euro of direct payment. The greening component of the payment is assigned to farmers entitled to a payment under the basic payment scheme and that comply, on their eligible hectares, with some ecological prescriptions. Application of greening and relationship between provision of environmental good between first and second CAP pillars are central in the on-going scientific debates about the greening payments (see for example Matthews 2012).

**Methodology**

**Overview**

The methodology is composed by two exercises conducted in parallel. We apply a revision and extension farm household investment model, previously used in other works (Viaggi et al., 2011), in order to simulate the demand curves for land. At the same time, we performed a survey of farmers stated intentions
concerning future reforms, in order to provide empirical information on the reaction to the reform. A selection of survey information is then used to feed the model for simulation. In the remaining of this section we first describe the survey and then the modelling framework.

The survey

The survey was conducted in the early summer 2012 on a random sample of 350 farm households out of 7379 beneficiaries of CAP payments located in Bologna province. The questionnaire has been filled through a telephone interview which focused on farmers’ intentions about land size expansion/reduction conditional on the introduction of some specific measures of the post 2013-CAP reform proposal. More specifically they were asked to state intentions about rent-in/out more/less land and buy/sell more/less land assuming the introduction of the regionalized payments, the greening and the capping measures with respect to what their would have done in baseline scenario (current CAP system). The sample has been proportionally stratified by altimetry location (mountain, hill, Bologna hill, plain) and by the amount of CAP payments received in 2011 (below and above the mean). The questionnaire was divided in different sections: first, information about farm characteristics, labour features and market strategy have been asked, afterwards CAP payments and generic planned future activities were requested, then questions concerning expansion/reduction intentions under current CAP and under post 2013-CAP proposal have been performed, and finally personal and household characteristics were requested.

The farm characteristics are related to farm size, location, legal form, main farm specialization, typology of crops and animals breeding, intensity of livestock production, surface at agro-environmental or ecological measure, hectares involved in photovoltaic or biogas systems. In the same section information have been asked on lands rent-in and rent-out, on the increase/decrease of land owned or rented in the previous years (from 2002), and on the presence of relatives among owners or tenants of the farm. About labour characteristic, information was asked about the number of household members working full-time or part-time in the farm and the number of external workers full and part-time working in the farm. Market strategies were investigated through questions about channel which the farms sell the products through, in relation to the main farm specialization, about presence of sales contracts, internet use to buy inputs or sell output of farm production. Regarding the CAP payments, information on amount of payments, number of entitlements owned and the amount of others payments received in during year 2011, was collected. Moreover, it was asked to quantify how the farm revenue is affected by those payments. Also generic intentions questions were asked on adoption of new technology and on intention to stay in activity in the next years. Also the percentage of total gross family income from farming activity was investigated in this section. Household information was collected through questions concerning gender of family components, young, over 65 years old and number of unemployed. Farmers characteristics information collected are
related to farmer age and education level, the latter divided in 8 categories ranging from no title or primary school to PHD. It is important to underline that within the sample there is an outlier that was excluded from the analysis; in fact, the sample used for the model consists of 349 instead of the 350 respondents sampled. The farm characteristics are related to farm size, location, legal form, main farm specialization, typology of crops and animals breeding, intensity of livestock production, surface at agro-environmental or ecological measure, hectares involved in photovoltaic or biogas systems. In the same section have been asked information on lands rent-in and rent-out, on the increase/decrease of land in ownership or rented in the previous years (from 2002), and on the presence of relatives between owners or tenants of the farm. About labour characteristic were asked the number of household members working full-time or part-time in the farm and the number of external workers full and part-time working in the farm. Market strategies are investigated through questions about sales channel which the farms sell the products derived from the main farm specialization, about presence of sales contracts, internet use to buy inputs or sell output of farm production. Regard CAP payments, information on amount of payments, number of entitlements owned and the amount of others payments received in 2011, was collected. Moreover, was asked to quantify how the farm revenue is affected by those payments. About generic intentions question on adoption of new technology and on intention to stay in activity in the next years was asked. Also the percentage of total gross family income comes from farming was investigated in this section. Household information’s are collected through questions concerning gender of family components, number of minors, of over 65 years old and number of unemployed. Personal characteristics have been asked related to farmer age and education level, the latter divided in 8 categories ranging from no title or primary school to PHD. It’s important to underline that within the sample there is an outlier that was excluded from the analysis; in fact, the sample used for the model consists of 349 instead of the 350 respondents sampled. It is a cooperative farm with dimensions of 1870 hectares, mainly cultivated with cereals and bioenergy crops, clearly outside the standard of the area. The main descriptive statistics about the sampled farms are reported in table 1.

Table 1: Descriptive statistics
The model

Ciaian et al., 2012 and Puddu et al., 2012 developed a theoretical analysis aimed to investigate the impact of regionalisation on land price in a two-farm and to simulation farm-level demand curves. Puddu et al., 2012 also developed a model to simulate the effects of regionalisation (intended as the move from historical payment to fully regionalised) in the province of Bologna (Italy).

The objective function is the total profit of one area, assuming the possibility of land reallocation among the i-farms (i=1,2,...n):

$$\text{Max } \Pi = \sum_i \pi_i(l_i, x_i, p_i)$$
s.t.: 

\[ \sum_{i} l_i \leq L \]

Where: \( \Pi \) = total profit of the area; \( \pi \) = profit function of farm \( i \); \( l \) = land available for farm \( i \); \( x \) = other productive factors affecting land profitability for farm \( i \); \( p \) = policy parameters for farm \( i \); \( L \) = total amount of land available in the area.

In order to operationalise the model, further specification of the profit function is needed allowing to recover the above profit function from information about actual farms, local rents and the policy parameters in place. Initially assuming that farms decide about their land size through renting only, let us assume farms maximize the following objective function:

\[
\text{Max } \pi_i = s_i f(l_i, x_i) - rl_i
\]

Where: \( s \) = scaling factor for farm \( i \); \( f \) = general profit function of land; \( r \) = local land rent.

First order conditions (with respect to \( l \)) are: 

\[
s_i \frac{f'(l_i, x_i) - r}{f(l_i, x_i)} = 0
\]

i.e. 

\[ s_i = \frac{r}{f'(l_i, x_i)} \]

In other words, assuming we know the shape of a normalised (marginal) profit function, actual land available \( (l) \), the rent \( r \) and assuming a well behaved (decreasing) demand curve, we can derive an individual scaling factor for each individual farm and an overall individual function for simulation.

This general approach can include (and interact with) policy in different ways. In the case of the SFP, the formulation would become:

\[
\text{Max } \pi_i = s_i f(l_i, x_i) + SFP e_i - rl_i
\]

With 

\[ e_i \leq E_i \text{ and } e_i \leq l_i \]

Assuming that a farm will activate all available entitlements, using the available land, then there are two options. If \( E_i \leq l_i \) then the profit becomes: 

\[ \pi_i = s_i f(l_i, x_i) + SFP e_i - rl_i \]

with SFP independent from \( E \) and the marginal value calculated as before. If \( E_i > l_i \) the profit function becomes 

\[ \pi_i = s_i f(l_i, x_i) + SFPL_i - rl_i \]

and the first order conditions of its derivative with respect to \( l \) become:
The formula is analogous for the basic payment in a regionalised model, in which, however, the SFP is substituted by a RP and there is no restriction to the connection between entitlements and the land area.

However, as modelling shows that some SFP can be capitalised in marginal land rent even when the entitlements are lower than the land available (Latruffe and Le Mouël, 2009), we can express this as a fraction $c$ of the average SFP per ha SFP ha ($SFPha = SFP \frac{E_i}{l_i}$), i.e.:

$$s_i = \frac{r - cSFPha}{f'(l_i, x_i)}$$

In the model we use this approach to identify the $s$ factor. Once this is found, we can use the full model for simulation. In particular, as a consequence the effect of the post 2013 CAP reform on the land market in the area can be calculated as the difference between the current situation and the new situation assuming a redistribution of the total amount of payments in the area based on a regionalised payment, by comparing the following situations:

Max $\pi_i = s_i f(l_i, x_i) + SFP e_i - rl_i$ (see equation in the model consistent with $s_i = \frac{r - cSFPha}{f'(l_i, x_i)}$) (a)

Max $\pi_i = s_i f(l_i, x_i) + RP e_i - rl_i$ (b)

Where RP is the regionalised payment.

An alternative modeling framework explicitly considering ownership vs. renting and including transaction costs is also considered. Following the model developed above, and based on the model developed by Deininger et al., (2008) and Bartolini and Viaggi (2013), when the transaction costs associated with renting-in or renting-out are positive, the optimisation problem can be rewritten as:

$$\max \pi = s_i f(A_i, x_i) + SFP e_i - I^{in}[A_i - \overline{A}_i] (r + tc^{in}) + I^{out}[\overline{A}_i - A_i] (r - tc^{out})$$

s.t. $A_i \geq 0$ (1a)

where $\overline{A}_i$ is the land endowment by farm $i$; $f(A_i, x_i)$, with $f'(\ ) > 0$ and $f''(\ ) < 0$ represents the general profit function of the land operated ($A_i$), and the quantity of labour ($L$) used on the farm (both
household and external labour) and the optimal farmed area \((A^*)\); \(l^{in}, l^{off}\) are two indicators for the rent-in or the rent-out activity. These two elements can have a value of zero when they are not activated or a value of one when the farm household is rented-in or rented-out, respectively; \(r\) is the net rental price that is assumed constant in the rental market; \(tc^{in}, tc^{out}\) represent the transaction costs associated with the renting-in or the renting-out. Following Deininger et al., (2008) and Deininger and Jin (2008) the first order condition (FOC) when the household rents-in \(A^* > \bar{A}\) yields \(s_i f'(A_i, x_i) = r - cSFpha + tc^{in}\) then \(s_i = \frac{r - cSFpha + tc^{in}}{f'(A_i, x_i)}\); otherwise, when the household rents-out a portion of the land \(A^* < \bar{A}\) the FOC yields \(s_i f'(A_i, x_i) = r - tc^{out}\) and then \(s_i = \frac{r - cSFpha - tc^{out}}{f'(A_i, x_i)}\); finally, when the household land endowment is entirely used by the household itself, \(A^* = \bar{A}\), the FOC yields \(r - cSFpha - tc^{out} < sf'(A_i, x_i) < r - cSFpha + tc^{in}\) and then, \(\frac{r - cSFpha - tc^{out}}{f'(A_i, x_i)} < s_i < \frac{r - cSFpha + tc^{in}}{f'(A_i, x_i)}\).

In order to calibrate the model using the data collected by the survey, the following assumptions are hypothesized:

- The land demand function can be recovered based on information about demand slope (function) and the amount of land available.
- Land can only be traded within each sub area of the study area (there are four sub areas: mountain, hill, Bologna hill, plain).
- The decoupled SFP is actually partially coupled due to rotations, contracts etc.
- The regionalised payment will be uniform across the whole area and calculated based on the total SFP/UAA of the area (this is also, necessary in order to the different models to be comparable); a different hypothesis made is that the regionalised payment is uniform within each sub area of the whole study area (mountain, hill, Bologna hill and plain).
- In the model we use the individual farms in the Bologna province assuming altogether they are representative of the dynamics of the area.

An inspection of survey information available shows that information about the amount of entitlements is largely missing (only 43 out of 349 interviewed farmers reported this information). In the large majority of cases in which it is available, the farm UAA (largely) exceeds the number of entitlements. Only 2 cases report a number of entitlements higher than the UAA and 5 report a number of entitlements equal to that of the UAA.
Based on the rationale of the policy instrument, it would be reasonable to assume that entitlements (on the historical basis) do not affect the marginal value of land for most the farmers in the area (see also Bartolini and Viaggi 2013).

However, past evidence shows that there is some degree of capitalisation due to various reasons, including rotations, etc. Based on the data from the metamodelling (Bartolini et al., 2011) the % of SFP value (per hectare average) coupled to the marginal value of land is 58%. This value is also assumed in this paper for the calibration process.

Numerically c is obtained by metamodelling, through interpolating the marginal data reported in Bartolini et al., 2011 and the normalised demand function (f) is calculated by interpolation of the points generated through simulation in Puddu et al. (2012). Land areas and SFP per farm, are those collected in the factor markets farm survey described above, while information about land rental prices have been collected through expert interview.

**Results**

Stated intention, from the survey, on changes in farmland dimension as consequence of the introduction of specific measures of regionalised direct payments, with respect to the situation with present CAP, show a similar trend in the different options tested with value of change below 13%. The options of no change cover the majority of the sample (Table 2).

**Table 2: Pattern of responses to regionalised payments.**

<table>
<thead>
<tr>
<th>CAP Measure</th>
<th>Change</th>
<th>Mode</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regionalization</td>
<td>Expansion</td>
<td>buy</td>
<td>36</td>
<td>12.04</td>
</tr>
<tr>
<td>Regionalization</td>
<td>Expansion</td>
<td>rent</td>
<td>38</td>
<td>12.71</td>
</tr>
<tr>
<td>Regionalization</td>
<td>Reduction</td>
<td>sell</td>
<td>10</td>
<td>3.34</td>
</tr>
<tr>
<td>Regionalization</td>
<td>Reduction</td>
<td>rent</td>
<td>23</td>
<td>7.69</td>
</tr>
</tbody>
</table>

The previous table is obtained combining more than one answer; as an example, the regionalized scenario, with reduction of rented land, was obtained through a grouping of the two positive answers to the questions about intention to rent-out more land and on intentions to rent-in less land.

Table 3 shows some elaborations on intention of expanding or reducing farm size with the regionalization.

**Table 3: Comparison between expansion and reduction in rented area (Regionalized scenario).**
The previous table shows that the farmers with intentions to expand the rented area are more than those who want to reduce it and the majority of the sample show no intention to change.

Table 4 shows that there are more farmers which intention is to reduce the rented area than those which intention is to reduce the land in property.

Table 4: Regionalization: Comparison between reduction in terms of rented area and in terms of land in property.

<table>
<thead>
<tr>
<th>Regionalization</th>
<th>Reduction</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>. Rent in less land</td>
<td>. Rent out more land</td>
<td></td>
</tr>
<tr>
<td>Expansion</td>
<td>NO</td>
<td>YES</td>
<td>Total</td>
</tr>
<tr>
<td>. Rent in more land</td>
<td>243</td>
<td>18</td>
<td>261</td>
</tr>
<tr>
<td>. Rent out less land</td>
<td>33</td>
<td>5</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td>276</td>
<td>23</td>
<td>299</td>
</tr>
</tbody>
</table>

That supports the literature that assigns to the rental market more mobility than the sales market and hence more reactivity to changes in policy.

The results of the model are illustrated in table 5. The regionalisation of payments causes an increase of total income: from 5.119 million euro to 5.698, as a result of the fact that with the regionalised payments land allocation is not driven by entitlements and hence land is allocation reflecting the private optimum without any policy-driven distortion.
Table 5: Main results of the model

<table>
<thead>
<tr>
<th></th>
<th>Baseline (Historical SFP)</th>
<th>Regionalised payment</th>
<th>Regionalised payment per zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total gross margin (Meuro)</td>
<td>5.119</td>
<td>5.698</td>
<td>6.892</td>
</tr>
<tr>
<td>Marginal land value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mountain</td>
<td>200</td>
<td>372</td>
<td>251</td>
</tr>
<tr>
<td>hill</td>
<td>350</td>
<td>509</td>
<td>542</td>
</tr>
<tr>
<td>Bologna hill</td>
<td>350</td>
<td>506</td>
<td>404</td>
</tr>
<tr>
<td>plain</td>
<td>600</td>
<td>744</td>
<td>789</td>
</tr>
<tr>
<td>N. farms</td>
<td>349</td>
<td>160</td>
<td>160</td>
</tr>
<tr>
<td>N. farm Transaction costs model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TC=0</td>
<td></td>
<td>122</td>
<td>117</td>
</tr>
<tr>
<td>TC=0.1</td>
<td></td>
<td>223</td>
<td>152</td>
</tr>
<tr>
<td>TC=0.2</td>
<td></td>
<td>292</td>
<td>211</td>
</tr>
<tr>
<td>TC=0.3</td>
<td></td>
<td>320</td>
<td>265</td>
</tr>
</tbody>
</table>

The total income does not differ among the two regionalisation options, due to the fact that land allocation is the same and also the total amount of payments distributed.

There is an increase of marginal land values as revealed by the land constraints in the model (which could hint at an increase in land prices); this may be due to two main effects:

- the regionalised payment directly affects the marginal value, differently from the historical payments, constrained by the mechanism of entitlements;
- there is an increase in the marginal productivity of land due to better re-allocation of land.

The marginal value of land (and supposedly the income) per zone changes among the two regionalised options, as they imply a different re-distribution of payments across areas. In particular, the uniform regionalised payments would yield relevant increases of marginal value of land in mountain areas.

The results also indicate a major tendency to the re-allocation of land, which concentrates in only 160 farms (less than half). This does not differ among the two regionalisation options, due to the fact that land is constrained to be re-allocated within the same zone and the optimal allocation does not change with changing the level of regionalised payments.
The model with inclusion of transaction costs corroborates the same ideas, but also emphasise that the actual land re-allocation would depend on the actual transaction costs. The effect of assumptions about transaction costs is twofold. First, by affecting model calibration. Assuming transaction costs the differential of marginal value of land across farms is emphasised and this yields different results (more intense re-allocation) in the option with zero transaction cost (less farms remaining). Increasing transaction costs causes a reduction of land exchanges and hence a higher number of farms remaining. It is expected that there is no difference between the two regionalisation hypotheses.

Discussion

This work uses survey and modelling information to assess the impact of post 2013 CAP reforms. Altogether the results of the model corroborate and are largely consistent with the results from the survey. In particular, both hint at the fact that there are farms interested in selling/buying land in opposite directions in the area in case of regionalisation. However, the high level of no changes in the survey, which is normal when comparing modelling results with actual intentions, reveal that any change would occur at least much more gradually than indicated by the model. Both survey and modelling results are basically consistent with the previous literature, respectively in terms of stated reactivity to policy reforms and direction of changes. This is also due to the fact that the model design is largely theoretically-driven.

This work is affected by several limitations. A key limit of this work is the current uncertainty about the Cap reform (now still in phase of negotiation). This does not allow making realistic hypotheses about the actual details of the allocation mechanisms in each area.

Another set of limitations derives from the characteristics of the model, which uses a very simplified approach not including specific technical constraints, land uses and technologies. Though they are incorporated in the initial model from which the demand function is derived, the interplay with change in the payment system cannot deemed to be fully accounted for. The results are particularly affected by the assumption about the homogeneity of the slope of the demand curve, due to data limitations.

In addition, in spite of the use of transaction costs, the model cannot be deemed to fully incorporate obstacles to land transaction, including distance effects, life cycle of the farms, etc., as well as other factors affecting land values and transactions. As a result, the changes due to the reform and the related economic effects are certainly overestimated compared to reality. This is also showed explicitly considering the effect of transaction costs and by comparing the results of the survey with the results of modelling. On the other
hand the results of the model may indicate the tendency of adaptation over time in case a regionalisation reform is approved in the area.

Several other limitations apply, in relation of the specificity of the area. The Province of Bologna is rather heterogeneous, which may increase reactivity to changes in policy and over-emphasise the tendency through adaptation through land exchanges. Due to such heterogeneity, also the way the calculation of the new regionalised payment would be performed is unclear and hence its comparison with other areas may require a re-thing of the potential differences in the regionalisation rationale. For the same reasons, it is difficult to compare these results with those of other studies.

**Conclusion**

Modelling and survey information show a reaction of the land demand to the shift from the historical to the regionalised payments. The regionalized payment seems to be more capitalized into the land value, at the margin, as long as it is less connected to entitlements. As a result, the regionalisation would cause increased rental prices. From an economic point of view, overall agricultural income would benefit from regionalisation due to a more efficient allocation of land.

The reaction is strongly influenced by the previous historical system of distribution of payments. In fact, the quantity of entitlements owned before the reform and the link of these with the farm area is the key factor in affecting the change in land demand due to the upcoming reform and how each farm would interact with the market. The difference in historical payment and the hypotheses about how the regionalised payment will be calculated also affect strongly the outcome of the modelling exercise.

A straightforward development of this work is hence to be found in the revision of the model once the reform is approved and the implementation process better clarified. In addition new instruments could be included in the analysis and/or better developed, such as the greening or the capping.

On the other hand, the model can be better specified in the direction of accounting for a wider range of farm features, such as labour availability and specialisation, which are largely unexplored in the present paper. It could also be extended to an actual territorial model rather than just a model of land trade within the farms of the sample considered.

Another line of investigation rests in the use of a dynamic model, which could better account for the process of adaptation.
Finally, a more realistic specification of spatial interactions, allowing for distance and neighbouring effects could be devised.

**Acknowledgment**

The content of this paper was developed within the project “Comparative analysis of Factor Markets for agriculture across the member states” (Factor Markets), funded by the European Commission, 7th Framework Programme. This work does not necessarily reflect the view of the European Union and in no way anticipates the Commission’s future policy in this area.

**References**


