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► **To cite this version:**

Laure Latruffe, Tomas Doucha, Chantal Le Mouël, Tomas Medonos, Vaclav Voltr. Capitalisation of government support in agricultural land prices in the Czech Republic. 93. EAAE seminar : Impacts of decoupling and cross compliance on agriculture in the enlarged EU, European Association of Agricultural Economists (EAAE). INT., Sep 2006, Prague, Czech Republic. 12 p. hal-02285587

HAL Id: hal-02285587

<https://hal.science/hal-02285587>

Submitted on 6 Jun 2020

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Capitalisation of government support in agricultural land prices in the Czech Republic

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Contributed paper presented at the 93rdth EAAE Seminar, Prague, 22-23 September 2006

Abstract

The recent implementation of CAP area payments (the Single Area Payments, SAP) in the New Member States of the EU raises the question of whether a quick capitalisation of these payments is expected. Evidence of capitalisation of public support to agriculture into land prices indicates that benefits are partly transferred toward landowners rather than toward the targeted population (the producers). This distributional aspect is of particular importance in countries where a large proportion of land is farmed by producers who do not own this land, such as in the Czech Republic where corporate farms and large individual farms cultivate most of the agricultural area of the country, but rent more than 90% of it from millions of private landowners.

This study investigates the influence of several types of support on Czech agricultural land prices from private transactions between 1995-2001. The results show that only direct payments have been capitalised into land prices. This capitalisation occurred in spite of the payments' low level and of an imperfectly functioning land market, suggesting that such type of support is most easily transferred to land values.

If the rate of capitalisation of such payments continues or even increases in the future (the SAP are relatively high compared with what Czech farmers used to receive before accession), this might threaten the farming activity in this country, as farms are almost only tenanted. And because most of the landowners live in towns, there is a risk of an extreme leakage of support not only outside the farming sector, but also outside the rural sector.

Keywords: land prices, agriculture, capitalisation, public support, direct payments

Capitalisation of government support in agricultural land prices in the Czech Republic

1. Introduction

The large fluctuations in farmland prices that have been observed in some developed countries have stimulated research on the factors influencing land prices. Among these factors, government agricultural support programs have received special attention because their potential impact on farmland prices raises the sensitive questions of the leakage of support out of the agricultural sphere, and of the distribution of the benefits of support programs. While supporting farmers' income is a major objective of agricultural policies, if implemented programs make agricultural land prices to drive up, they raise production costs, hence transferring benefits toward landowners rather than toward the targeted population (the producers). This distributional aspect is of particular importance in countries where a large proportion of land is farmed by producers who do not own this land, such as in the Czech Republic where corporate farms and large individual farms cultivate most of the agricultural area of the country, but rent more than 90% of it from private landowners.

Most of existing studies dealing with farmland price formation have been undertaken in North America. For example Barnard *et al.* (1997) in the United States (US) and Clark *et al.* (1993) in Canada found some evidence of capitalisation of subsidies in land values. By contrast, very few studies are concerned with farmland price formation in the European Union (EU), although the topic is gaining increasing attention following the last two Common Agricultural Policy (CAP) reforms attempting to decouple the support, and none of them are in the Central and Eastern European Countries (CEECs) (for a review of existing studies, see Latruffe and Le Mouël, 2006b)

The objective of the paper is to assess to what extent the government support in the Czech Republic has been capitalised in the price of agricultural land over the past period 1995-2001. Not only will this paper contribute to the research about the issue of support capitalisation in the EU and in particular in CEECs, but such analysis is even more legitimate in New Member States (NMS) such as the Czech Republic, where the level of support post-accession is much higher than pre-accession.

The paper is structured as follows. The next section reviews the concept of capitalisation of public support in agricultural land prices, and describes the evolution of agricultural support and the characteristics of the agricultural land market in the Czech Republic. The third section presents the methodology and the data, while the fourth section discusses the results. The last section concludes.

2. Background

2.1. Capitalisation of public support in agricultural land prices

Capitalisation formulae, derived by the present value model (PVM), underlie most of the studies concerned with farmland price formation. The PVM stipulates that the price of an income-earning asset at the beginning of a time period t (L_t) is equal to the discounted expected value of the stream of future net returns or rents to this asset:

$$L_t = \sum_{i=0}^{\infty} \frac{E(R_{t+i})}{(1+r_{t+1})(1+r_{t+2})\dots(1+r_{t+i})} \quad (1)$$

where R_{t+i} is the net real return at the end of time period $t+i$, generated from owning the asset, r_t is the time varying discount rate, and E is the expectation on returns, conditional on information in period t .

Several studies investigating farmland price formation based on PVM have used the capitalisation formula given in (1) in the simplest form, that is to say assuming a constant discount rate and risk neutral individuals, and ignoring differential tax treatments of capital gains and rental income (e.g. ERS USDA, 2001; Shaik *et al.*, 2005). In this case, the model reduces to the basic capitalisation formula as follows:

$$L_t = \frac{R_t}{r} \quad (2)$$

where r is the time-constant discount rate.

However, many refinements of the formula can also be found in the literature, whether it is assumed a time-varying discount rate, various expectation schemes, differentiated taxes, or that the agricultural land prices may result from alternative uses of land (e.g. Alston, 1986; Lloyd *et al.*, 1991; Chavas and Jones, 1993; Just and Miranowski, 1993; Goodwin *et al.*, 2003). As for the investigation of the capitalisation of public support in agricultural land prices, it can be done by separating the returns to farming into the returns from production and the subsidies received (e.g. Weersink *et al.*, 1999; Lamb and Henderson, 2000; Duvivier *et al.*, 2005).

An alternative framework to the PVM, for investigating the effect of public support on farmland prices, is the hedonic price approach (e.g. Barnard *et al.*, 1997; Taylor and Brester, 2005). This approach relies on the idea that the land price is determined by the meeting of sellers' and buyers' bids, based on their respective maximised profit. However, in this framework determinants of land price are often chosen in an *ad hoc* way.

Despite the difference in approaches, most of the empirical studies gave evidence of significant impact of government payments and other types of support (price support, quotas) on agricultural land prices. In general, studies agree that the support accounts for around 15-30% of the land prices (e.g. Just and Miranowski, 1993; ERS USDA, 2001; Shaik *et al.*, 2005), and that land prices are more responsive to government-based returns than to market-based returns (e.g. Goodwin and Ortalo-Magné, 1992; Weersink *et al.*, 1999; Duvivier *et al.*, 2005). Most of the studies were applied to the US or Canada, and more rarely to Europe (the United Kingdom, France or Belgium, never in CEECs).

2.2. Development of the agricultural policy in the Czech Republic

Based on policy priorities, it is possible to identify five phases in the agricultural policy development in the Czech Republic during the period 1989-2004. The beginning of transition was marked by the introduction of market liberalisation and basic legislation for property transformation in agriculture, but the support to farm income was similar to the pre-reform period. Such phase of "initial policy" (1989-1992) triggered the process of farm restructuring. The process of restitution and transformation graduated in the second phase of further liberalisation, "liberal policy" (1993-1994). However, this phase was characterised by the almost total reduction of all income support to farms. By contrast, investment support (in the form of interest free loans), for establishing and strengthening new farms, was introduced. The next policy phase of "development and stabilisation" (1995-1998) consisted in gradually re-introducing direct support in a view of easing farms' financial problems, and in launching new forms of investment support such as interest-subsidised and guaranteed loans. The policy phase in the next year (1999-2000), "revitalisation", started off the adjustment of the Czech

policy to a CAP-like policy. The policy emphasised the re-orientation of farms on non-market activities and the multifunctional roles of agriculture. A relatively large share of supports was given in the form of various disaster payments. In the “pre-accession–adaptation” phase (2001-2004), the stress was put on the alignment with the CAP, with policy measures including legislative and institutional harmonisation with the EU. The policy was assisted with EU pre-accession structural programmes (SAPARD).

Figure 1 shows the evolution, during the period studied in this paper (1995-2001), of the value of four types of support to agriculture in the Czech Republic: market price support, payments based on input use, payments based on area planted/animal numbers, and other payments. Following OECD definition, the latter include payments based on output, payments based on historical entitlements, payments based on input constraints, payments based on overall farm income, miscellaneous payments, and general services. The absolute value of total support experienced a peak in 1998, just before the start of the alignment of the Czech policy on CAP measures. Market price support accounted for the major part of total support, except in 1997 where payments based on input use were the bulk. Direct payments (i.e. payments based on planted area or on animal numbers) were almost inexistent in the beginning of the period considered (2% of the total support), but increased considerably to almost one quarter of total support in 2001.

After EU accession on 1st of May 2004, the structure and orientation of support have not been altered in principle. However, the amount of support changed markedly. In comparison with the period of 2001-2003, subsidies for farms have increased nearly twice, from 15,000 million CZK to almost 30,000 million CZK. According to Doucha (2006), the support after EU accession is for half distributed in the form of direct payments per ha, the Single Area Payments (SAP), supported by the EU budget. Farms can also receive coupled top-ups and other direct commodity payments from national resources. Less Favoured Area (LFA) payments and agro-environmental support in the framework of Horizontal Rural Development Program have increased nearly three times compared with the pre-accession period, and are playing a substantial role in farm income. A substantial part of former investment support provided by the Support and Guarantee Farm and Forestry Fund (SGFFF) was re-allocated in the form of operational support, with a bigger focus on food security, animal welfare and environment. Finally, market price support (from the EU budget) and other national subsidies (including disaster compensations) have been reduced, while nominal value of support in the frame of the general services (research, education, extension services, etc.) is on a similar level as pre-accession.

2.3. The Czech agricultural land market

The Czech agricultural land market was utterly insignificant in the pre-reform period. Although private ownership of land, resulting from several land reforms that started in 1918, was not abolished under the communist regime, land use rights totally prevailed to land ownership rights. The changes in land property and use after 1989 have been directly influenced by several policy measures, including the legislation for restitution of ownership titles (The Land Law), the legislation for privatisation of state-owned land (since 1999), the delimitation of the level of rents (to 1% of the administrative price of land in case both parties do not reach an agreement¹), the legislation for land consolidation (re-parcelling), the introduction of administrative limits to land purchases by foreigners (The Foreign-Exchange Law), the establishment of rules for the market of private land (The Civil Code, The Business

¹ All agricultural land for individual cadastres (as elementary area units) is given an administrative price, used in particular for tax purposes. The prices reflect soil quality or the so-called rent effects.

Code), and the launch of supports for the purchase of private land through the SGFFF² and for land consolidation.

However, the functioning of the land market is still hindered by several barriers, which are mostly the heritage from the past. Owners' identification in regions where Germans were expelled after World War II and where the special allotment system was applied for newcomers, is still problematic. Regarding the parcels themselves, the main problems are the inaccessibility to them, and the impossibility to physically identify their boundaries. Particularly after 1970, during the creation of the socialistic large-scale farming, parcels were merged into extremely large fields, accompanied with the almost total destruction of natural physical boundaries. The merging of plots additionally resulted in a severe fragmentation of ownership (there are nowadays millions of very small landowners), sharply contrasting with the extreme land use concentration (about 5% of the farms use about 75% of the land). Another consequence is the inconsistency between the land ownership registration and the land use registration. According to the Czech Cartography Authority, the sum of the (owned) parcels amounts to about 4.3 million ha of agricultural land. This area is defined as the Czech Agricultural Land Fund (ALF). However, according to the Czech Integrated Administrative and Control System (IACS), the sum of (used) land blocks of the Czech agricultural land, eligible for direct payments, amounts only to about 3.5–3.6 million ha. This area is defined as the Czech Utilised Agricultural Area.

Most of the abovementioned problems can be alleviated by the realisation of land consolidation (re-parcelling) in individual cadastres. However, in spite of policy declarations, the financial sources for these purposes have been relatively low for a long time, and the processes have been very slow. After 15 years of reform, the complex land consolidations cover only about 5% of the Czech ALF, representing only 571 cadastres out of 13,000 (only 226,000 ha of agricultural land). This echoes Dale and Baldwin's (2000) conclusions. The authors argued that three pillars are necessary for the effective functioning of the land market: 1) land registration (to ensure ownership titles and rights), 2) land valuation (to provide basis for pricing), and 3) financial services (to ensure access to capital and credit). Dale and Baldwin then carried out a comparative study of some CEECs, in terms of achievement in each pillar over the transition period. According to them, the reform in the Czech Republic has mainly developed the first pillar, but the latter is still insufficient (rated 3.5 on a scale from 1 to 5). As a consequence, the land sale (and even lease) market is still undeveloped, burdened with high transaction costs and accompanied with a weak bargaining power of landowners (or with a monopsony position of land users, respectively). This results in relatively low prices of land or low rents for leased land (Vrbova and Nemeč, 2005).

Nowadays the Czech land market consists in four main segments, depending on whether land is leased or sold, and whether there is state interference or not. The lease market, whether it is for state-owned or private land, still utterly prevails as a consequence of the abovementioned barriers and problems: about 90% of the farms' utilised area is leased. The sale market, although it is influenced by the possibility to use the land for non-agricultural purposes, is therefore relatively insignificant. The sub-segment of sold land with state interference comprises land sold from the privatisation of the state land (1.0–1.5 % of the Czech ALF after 2002), land sold after restitution by the state of parcels that had been confiscated under the communist regime for housing or other purposes, and purchases of private land by the state in

² The programme "Land" in the frame of SGFF has been functioning since 2004. When purchasing private land, farmers can benefit from interest-subsidised loans extended by commercial banks but subsidised by the government. Banks also provide credit amounting to 80% of the collateral value of land for a repayment period of 10-20 years.

defined public interests (for industrial zones, highways, etc.) The fourth sub-segment, which is the one of interest for this paper, is the sale market for private land without any state interference. This sub-segment covers yearly only about 0.1–0.2% of the Czech ALF.

3. Methodology and data

3.1. The model

Theoretical model

The present study is based on the PVM as given by equation (1), assuming that agents are risk neutral and that tax rates are similar. The discount rate is not assumed to be time-constant, but the model is extended in two ways. Firstly, by separating the returns to land from two sources, market-based returns (M) and government-based returns (G), as in Weersink *et al.* (1999). Secondly, by including the value of the option to convert the land to non-agricultural use such as development ($CONV$), as in Goodwin *et al.* (2005). The PVM used here is therefore:

$$L_t = \sum_{i=0}^{\infty} \frac{M_{t+i} + G_{t+i}}{(1+r_{t+1})(1+r_{t+2})\dots(1+r_{t+i})} + CONV_t \quad (3)$$

Empirical specification

The above model suggest that factors affecting land prices are fourfold, M , G , $CONV$ and r . This implies land prices to be regressed on a proxies for market-based returns, government-based returns, non-agricultural land use, and discount rate.

The land prices used were prices per ha as averages per district and per year (*price*). Average yearly interest rates for credit in the country were used as proxy for the discount rate (*interest*). The market-based returns were proxied by average crop yields at the district level and per year (*yield*). Data about support to agriculture were unfortunately not available at the district level. One option was to use the support received by farms registered in the Farm Accountancy Data Network (FADN). However, the availability was constraining the estimation too much (data available from 1998 only), and besides, such data would not capture the support received by all farmers, as the FADN system is under-representative of small farms. Therefore, national data were used instead (*support*). This specification implicitly assumes that the effect of support is similar across districts. Several models were estimated. The first one includes the yearly total support to agriculture in value, while the others include separately one type of support in value, such as market price support, payments based on the planted area or animal numbers (called direct payments in what follows), etc (the separation of total support into different types of support for this research was made according to OECD classification, as explained in Section 2.2). As for the other use of land, the yearly average population density in the district was used (*density*). Additionally, the average plot size of the transactions was included in the model, in order to account for size effects not captured by the price per ha (*plot*).

Panel techniques accounting for district effects (*effects*) were applied. A double-log model was used, giving as coefficients the elasticity of the price with respect to each determinant. The equation estimated was therefore the following:

$$\ln(\text{price}_{i,t}) = \beta_0 + \beta_1 \ln(\text{plot}_{i,t}) + \beta_2 \ln(\text{interest}_t) + \beta_3 \ln(\text{yield}_{i,t}) + \beta_4 \ln(\text{support}_t) + \beta_5 \ln(\text{density}_{i,t}) + \beta_d \text{effects} + u_{i,t} \quad (4)$$

where i represents the district and t the period.³

3.2. Description of the data

In the Czech Republic the agricultural land market activity is followed since 1993 by the Czech Agricultural Research Institute (VUZE) for 25 districts, representing 37% of the agricultural area (ALF) of the whole country. In this paper, only private transactions were considered, between physical or private legal persons. All transactions, whatever the plot size, are registered in cadastres.

Figure 2 displays the evolution of the land prices as averages of the surveyed districts between 1995 and 2001. The average price for all plots exchanged shows an increasing trend, except for a drop in 1999. This fall in prices can be explained by the law introduced at this date about the sale of state land. The law implied that during the next year more than 750,000 ha of state-owned agricultural land was to be sold. Although such land is not considered in the statistics represented on Figure 2, such massive sale of state land reflected on the private market.

Figure 2 also shows that the average price for all plots over the whole period is around 8,000 euros per ha, which is extremely high when compared to other CEECs or to Western European countries (for a comparison of some EU-25 countries, see Latruffe and Le Mouël, 2006a). This average price is in fact driven up by the high prices of plots less than 1 ha, whose averages are also represented on Figure 2. Over the period studied, the average price of such plot is about 19,000 euros per ha. This is explained by the fact that very small plots of agricultural land, although they are registered as agricultural land type at the time of the transactions, are mainly sold for building purposes. On the contrary, plots larger than 5 ha, which are used only for agricultural purposes, are much less expensive as shown by Figure 2 (about 2,000 euros per ha) and closer to other CEECs' averages. But such plots account for the minority of the agricultural land exchanged on the Czech market: almost 90 % of the sales of agricultural land are below 1 ha, according to Vrbova and Nemeč (2005). This is confirmed in the sample used in this paper, where the average size of the plots sold over the period studied is 0.6 ha.

Regarding the other determinants, the support values have been discussed in Section 2.2 and Figure 1. As for crop yields, they have remained fairly stable during the period considered (around 4 t/ha for the whole country), while the population density has increased (reaching 117 inhabitants/km² on average for the country in 2001) and the interest rate has decreased (from around 13% in the first years to 7% in 2001).

4. Results

Results indicate that the total support to agriculture has no significant effect on the price of agricultural land during the period studied. A similar conclusion is reached for all types of support (based on OECD classification), except for direct payments (payments based on planted area or on animal numbers). Table 1 therefore reports the results for the model including this support variable only.

The high value of the Lagrange multiplier test showed that panel techniques were necessary, while the Hausman test indicated that random effects were preferred to fixed effects. While the interest rate and crop yield had no significant influence on the prices, the average plot size

³ Yearly dummies did not show any significant influence, and were therefore removed from the final specification.

and the population density have a negative, respectively a positive, effect. The former confirms what was shown by Figure 2, namely that smaller plots are more expensive than larger plots. The latter gives evidence of an opportunity cost of land for housing development.

The elasticity of land price with respect to direct payments, 0.13, indicates that for every additional euro per ha of support in this form delivered to agriculture, land prices are increased by 0.13 euro per ha. This figure is in line with studies in the US in the 90es, such as Lence and Mishra (2003) and Roberts *et al.* (2003), who found an increase of land prices by 0.13 to 0.85 dollars for one more dollar of public support. The fact that one additional unit of payment results in an increase of less than one land price unit, was also given evidence by Rutherford *et al.* (1990) using a general equilibrium model. The authors explained this dilution effect by the conditionality of the support, such as set-aside requirements which imply additional costs for participants and offset the benefit of the support. Similar costs can be considered for the direct payments to arable land in the Czech Republic during the last pre-accession years.

Additional estimations were performed using prices of various types of land (arable land, pasture, orchards and gardens). Only results of the effect of the direct payments are presented in Table 2. They indicate that such payments have no significant influence on the prices of pasture and orchards; by contrast they were capitalised in arable and garden land. The capitalisation rate was stronger for arable land than for garden land (elasticity of 0.15 vs. 0.11).

5. Conclusion

The continuous attempts by the European Commission to decouple support to farmers, and the recent implementation of CAP area payments in the Czech Republic, raise the question of the past capitalisation of support in this country, and in particular of direct payments. This study has investigated the influence of several types of support on Czech agricultural land prices between 1995-2001. Although the estimation would benefit from a longer time period and district-level support data, this first study in a NMS gives valuable insights about the issue.

The positive and significant effect of direct payments on agricultural land prices shown by the regression indicates that public support to agriculture has been capitalised into these prices in the Czech Republic over the period 1995-2001. This capitalisation occurred despite an imperfectly functioning land market. Besides, only direct payments were given evidence of capitalisation, in spite of their low level. All this might suggest that such type of support is most easily transferred to land values, in opposite to market price support or input subsidies for example.

This is a first stone in the debate of whether a quick capitalisation of the CAP support to Czech farmers could be expected after accession. The Czech Republic opted for CAP implementation in the form of the SAP scheme, that is to say direct payments per hectare without a production obligation. Although SAP are low in comparison to what EU-15 farmers are currently receiving, they are relatively high compared with what Czech farmers used to receive before accession. If the rate of capitalisation continues or even increases in the future, this might threaten the farming activity in this country, as farms are almost only tenanted. And because most of the landowners live in towns, there is a risk of an extreme leakage of support not only outside the farming sector, but also outside the rural sector.

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Figure 1: Evolution of public support to agriculture in the Czech Republic between 1995 and 2001

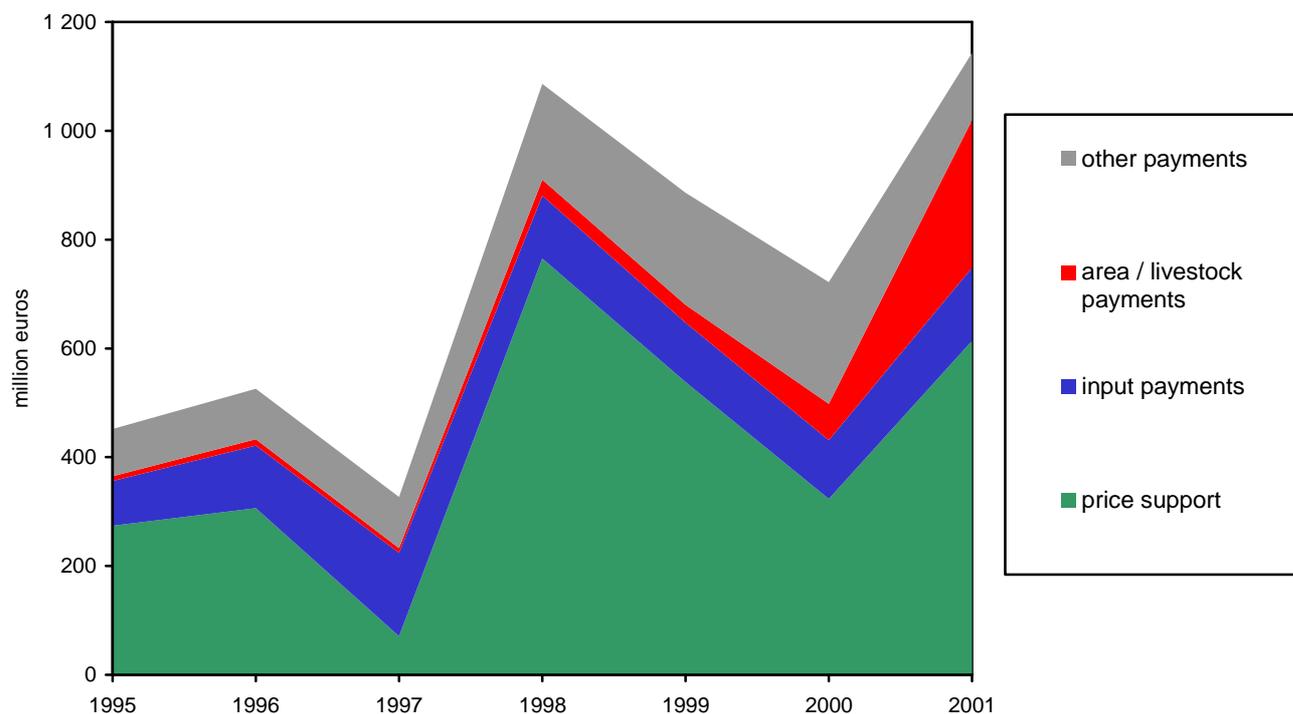


Figure 2: Evolution of the agricultural land prices in the Czech Republic between 1995 and 2001

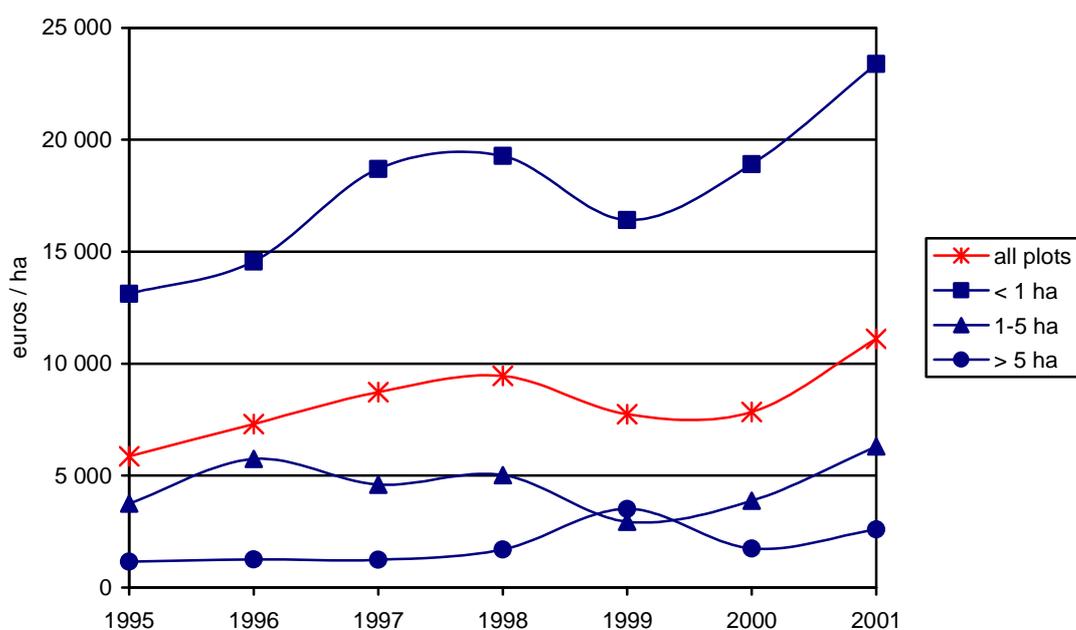


Table 1: Determinants of land prices for all plots

| <i>Model results</i> | | | |
|--------------------------|-----------|---------|--------------|
| Determinant | Parameter | t-value | Significance |
| Constant | 8.27 | 5.10 | *** |
| Log of Plot size | -0.54 | -5.03 | *** |
| Log of Interest rate | 0.33 | 1.21 | |
| Log of Crop yield | -0.15 | -0.44 | |
| Log of Direct payments | 0.13 | 2.00 | ** |
| Log of Density | 0.43 | 1.78 | * |
| <i>Model statistics</i> | | | |
| Lagrange Multiplier test | | 151.0 | |
| Hausman test | | 6.5 | |
| Number of observations | | 144 | |
| R ² | | 0.33 | |

Dependent variable is the logarithm of the average price for all plots.

Significance: ***, **, * is at the 1-, 5-, 10-percent level.

Table 2: Comparison of the effect of direct payments on different plot types

| Plot type | Parameter for Log of Direct payments | t-value | Significance | Number of observations | R ² |
|-------------|--------------------------------------|---------|--------------|------------------------|----------------|
| Arable land | 0.15 | 1.83 | * | 143 | 0.40 |
| Pasture | 0.13 | 1.52 | | 143 | 0.44 |
| Orchard | 0.15 | 0.83 | | 106 | 0.18 |
| Garden | 0.11 | 1.72 | * | 143 | 0.18 |

Dependent variable is the logarithm of the average price for the plot type considered.

Significance: ***, **, * is at the 1-, 5-, 10-percent level.