

The Influence of Per-hectare Premiums on Prices for Rented Agricultural Area and on Agricultural Land Prices

CLEMENS FUCHS

Abstract

Within the framework of decreasing support for agricultural incomes by market measures, the per-hectare premiums (ha-premiums) clearly have the task and the effect to stabilise farm incomes. Before direct aids were introduced, there had been periods with decreasing prices for agricultural land and for rented agricultural area in real terms, according to the Farm Accountancy Data Network (FADN) data base (specialised crop farms in 53 regions for 11 years) and EUROSTAT data (B, DK, D-W, F, NL in the period 1975 to 1999).

Regression analysis is used to show the relationship between ha-premiums, land rental prices and other relevant economic variables, such as land prices, rental share, livestock density, the price index of agricultural products and farm income. The analysis shows increasing price effects due to the introduction of ha-premiums on prices for agricultural land and on rental prices. Landlords received a share of about 6 % to 18 % of the ha-premiums (depending on the data source). An in-sample simulation, 1999-continuation scenario, and scenarios of further CAP (Common Agricultural Policy) reforms are used for the assessment of the ex-post and ex-ante developments. The ongoing reforms of the CAP (Agenda 2000, Mid-term Review) and EU enlargement certainly have implications for the land markets.

Key words: land markets; rental price; per-hectare premiums

Der Einfluss von Flächenprämien auf die Pachtpreise und die Kaufpreise für landwirtschaftliche Flächen

Bei abnehmender Stützung der landwirtschaftlichen Einkommen durch die Preispolitik kommt den Flächenprämien eine zunehmende Bedeutung bei der Stabilisierung der Einkommen zu. In den Zeiträumen vor Einführung der Direktzahlungen wird ein Rückgang der deflationierten Flächen- und Pachtpreise vom Informationsnetz Landwirtschaftlicher Buchführungen (Marktfrochtbetriebe in 53 Regionen über 11 Jahre) und von EUROSTAT (Daten für B, DK, D-W, F, NL im Zeitraum 1975 bis 1999) berichtet.

Mit Hilfe der Regressionsanalyse wird der Zusammenhang zwischen Flächenprämien, Pachtpreisen und anderen ökonomischen Einflussgrößen, wie den Preisen für landwirtschaftliche Flächen, Pachtanteil, Dichte der Viehhaltung, dem Preisindex für landwirtschaftliche Erzeugnisse und landwirtschaftliche Einkommen untersucht. Die Analyse zeigt ansteigende Preiseffekte in Abhängigkeit von der Einführung von Flächenprämien auf die Pacht und Kaufpreise. Das Ausmaß der Überwälzung von Flächenzahlungen auf Verpächter wird, in Abhängigkeit von der Datengrundlage, auf 6 bis 18 % geschätzt. Eine Simulation im Beobachtungszeitraum, ein Szenario ohne Politikänderung ab 1999 und Szenarios über die weitere Reform der gemeinsamen Agrarpolitik in der EU werden für Ex-post-Einschätzungen und Ex-ante-Vorschätzungen genutzt. Die bereits eingeleiteten Reformen der gemeinsamen Agrarpolitik in der EU sowie die EU-Osterweiterung haben sicherlich Auswirkungen auf die Märkte von landwirtschaftlichen Flächen.

Schlüsselwörter: Bodenmärkte; Pachtpreise; Ha-Prämien

1 Introduction

The reforms of the Common Agricultural Policy (CAP) over the last decade, the 1992-CAP reform and the Agenda 2000, have changed the composition of farm incomes. Lower product prices have been compensated by direct payments. Since 1992 an increasing share of the agricultural income has come from livestock premiums and ha-premiums. According to economic theory, the level of prices for rented area, which is demanded by agricultural entrepreneurs, is determined by the long-term profit level on the leased land (DOLL, 2002, p. 3). For the development of the agricultural land market, ha-premiums are of special interest. For other countries (USA) the contribution of government payments to rising land values have been analysed (RYAN et al., 2001). The question here is whether, and to what extent the premiums affect agricultural land prices and agricultural rental prices in the EU. This is analysed in-sample (until 1999) and ex-ante.

In the 1992-CAP reform direct aids (crop and animal premiums) were introduced to compensate for price reductions. For cereals, price reductions have been 33 %¹). The premiums have been increased, for example for cereals from 25 €/t of reference yield in 1993 to 35 €/t in 1994 and 54,34 €/t in 1995. For legumes and oilseeds higher premiums apply. The premiums have been changed according to the Agenda 2000 regulations and amounted to 58,67 €/t in 2000 and 63 €/t in 2001 for cereals and oilseeds, but with a different regulation for legumes, while the prices were decreased by another 15 %.

One might argue that over-compensation/under-compensation due to direct payments could have increased/decreased agricultural land prices. Or that the now more visible part of subsidies per hectare changed the competition situation between renters and landlords, and landlords demand their share of the direct payments and increase agricultural rental prices by a corresponding amount. Changes in farming profits coming from markets could also influence land prices.

Lease payments for agricultural land have increased in nominal terms from €151.5 per ha to €191.4 per ha in the period from 1989 to 1999 for specialised crop farms according to the Farm Accountancy Data Network (FADN) data base (Fig. 1). EUROSTAT reports increasing rental prices in nominal terms from €77.2 per ha in 1975 to €179.5 in 1989 and €238.2 in 1999. According to this source land prices also increased and accelerated over the last years of observation up to €14,783 per ha in 1999.

This more or less continuous increase in land prices is at a first glance astonishing, considering that at the same time the price index of agricultural products (deflated, 1990 = 100 %) decreased from 151 % in 1975 to 69 % in 1999.

1) In three steps; starting in 1993/94.

The economic pressure on agricultural production could lead to reduced factor prices, especially for those production factors which could be used only by agriculture, as is the case for agricultural land. If land prices do not decrease due to falling agricultural market revenues, then it can be assumed that an increasing share of the direct payments will be transferred to non-farming persons. This cannot be seen as a primary goal of the CAP, which has as one primary objective to provide fair income to agriculture. This issue is further discussed in chapter 2 on the basis of FADN data and in chapter 3 for EUROSTAT data.

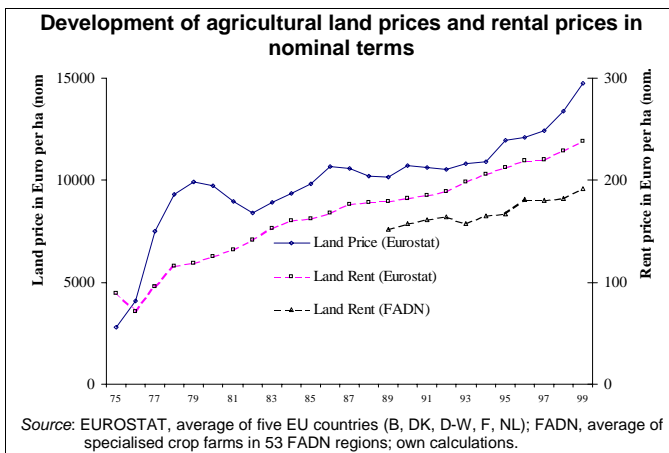


Figure 1

For the “Mid-term Review” of the Agenda 2000, as well as for the EU enlargement, it could be of interest to know how subsidies would influence rental prices and land prices further. The question to be analysed in chapter 4 is to what extent the change in supported prices for agricultural products and in direct payments would contribute to land price and rental price adjustments in the selected EU-Member States.

In chapter 5, the conclusions that can be drawn for countries in the transition process, if premiums were also to be applied to them, will be discussed. Special emphasis is given to the development of rental prices and land prices in Eastern Germany, as an example of a country in transition.

1.1 Data

Prices for rented agricultural area are available from FADN and EUROSTAT, while agricultural land prices are available only from EUROSTAT. In FADN, regional²⁾ data is available for the years 1989 to 1999. Data sets with missing values have been excluded. For specialised crop farms (farm type 1), data for 53 regions, and in total from 583 observations³⁾, could be used. Due to the fact that within FADN data no land prices are available, only the influence of the ha-premiums on agricultural rental prices can be analysed. With the second data source – EUROSTAT – the analysis will be extended to the effects on land prices.

The analysis with EUROSTAT data is restricted to countries with full data observations for agricultural land prices and for rented agricultural land in the period 1975 to 1999⁴⁾. Countries with observations on irrigated and non-

irrigated land, like Greece and Spain, are excluded. The countries B, F, and NL report prices for meadows and for arable land. Here weighted⁵⁾ average prices for buying and leasing agricultural land are calculated. All in all EUROSTAT provides full time series only for 6 EU countries (B, DK, D-W, F, L, NL) for the entire time period from 1975 to 1999. Because the analysis is done with panel data, the countries are treated with equal weight. Due to the extraordinary situation of land markets in Luxembourg (high price levels) and the small size of the country, Luxembourg data is also excluded from the analysis. The remaining 5 countries (B, DK, D-W, F, NL) are the basis for the analysis at country level. For the analysis in Eastern Germany, national data from 1992 to 1999, which is in accordance with EUROSTAT definitions, is used.

The two data bases are not comparable in the way that within the FADN source only a part of the totality of farms is covered, while the EUROSTAT data represents a countries average. Therefore it is to expect, that the results of different models do not match totally.

1.2 Methods

Data for analysis were available from EUROSTAT and FADN. The time series were analysed by using regression analysis on panel data⁶⁾, the endogenous variables being agricultural land prices and agricultural rental prices in nominal terms (deflated). As exogenous variables, which could explain the land price development, the following were chosen: share of rented land in total agricultural land (rental share), livestock density, farm income, price index of agricultural products and premiums. All monetary variables were deflated with a GDP deflator⁷⁾, for every EU-Member state, to correct for different inflation rates in the countries.

Scenario simulations are used to show the effects of a continuous or a changing frame work: In-sample simulation, 1999-continuation scenario, further CAP reforms (Agenda 2000 and Mid-term Review).

2 FADN Data and Results

2.1 Data, variables and hypotheses

Aggregated data at regional level is available from FADN for most countries. After pre-selection for plausibility (excluding obviously incorrect observations, for example regions with average ha-premiums over €2000 per ha) and keeping only regions with full observations in the time period 1989 to 1999, data for 53 regions remained: D-W (7), F (17), I (15), B, NL, DK, IRE, UK (5), E (2), P (3 regions). This left a total of 583 observations of specialised crop farms (farm type 1).

The hypotheses are that agricultural rental prices⁸⁾ (variable #1) depend on:

(#2) **Rental share**⁹⁾, where a higher rental share leads to lower land prices or rental prices due to the higher supply of land to buyers or renters;

5) Weighted by the respective hectare totals.

6) For regression analysis the RATS® software is used.

7) 1995 = 100 %.

8) Calculation: Rent paid/Rented utilised agricultural area (in €/ha).

9) Calculation: Rented utilised agricultural area/Total utilised agricultural area (in % of total)

2) http://europa.eu.int/comm/agriculture/rca/regioncodes_en.cfm; 06.09.02.

3) 53 regions x 11 years.

4) This is not the case for North-Ireland, so UK is excluded.

- (#3) **Livestock density**¹⁰⁾, with the tendency to increased rental prices in the case of specialised pig and poultry farms with a need for land;
- (#4) **Farm income** (without premiums)¹¹⁾, while it is expected that lower income would put pressure on the rental price level;
- and (#5) on the **premiums on crops**¹²⁾, which increased rental prices since the introduction of the 1992-CAP reform¹³⁾.

These five variables have been pre-selected from the FADN data set and used for regression analysis. Figure 2 shows the development of the average values of these selected variables.

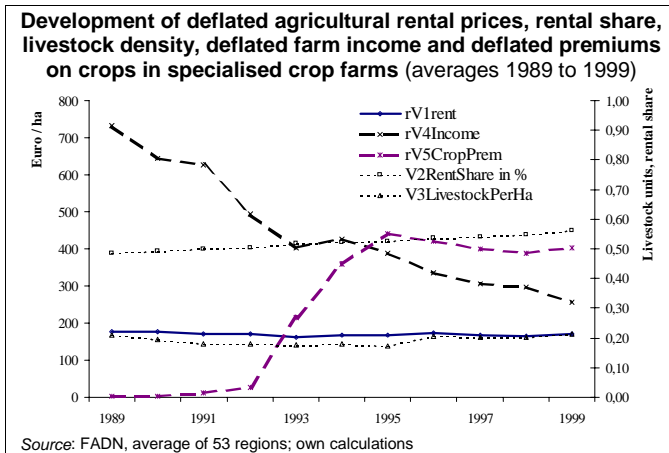


Figure 2

The deflated average **rental price** for agricultural land remained around €170 per ha in the period 1989 to 1999. The highest value was recorded in 1989 with €177 per ha, while the lowest was in 1993 with €162.2 per ha. The rental price then increased again up to €169.9 per ha in 1999. The **share of rented land** as a percentage of total utilised agricultural area increased by 7.7 %, from 48.4 % in 1989 to 56.1 % in 1999. On specialised crop farms the **livestock density** is relatively low, with around 0.21 livestock units per ha. This variable was lowest in 1995 with 0.17 livestock units per ha and increased again up to 0.21 in 1999. **Income without subsidies** was at only 35 % in 1999 compared to its 1989 (=100%) level. It decreased from €732.1 per ha in 1989 to €257.3 per ha in 1999. Finally, the **ha-premiums** increased from 0 in 1989 to €215.1 per ha in 1993, and were at a level of €403.1 per ha in 1999.

2.2 Regressions results on FADN data basis

The regression analysis is done with variables in arithmetic form (not in logs¹⁴⁾), because some of the data points are

10) Calculation: Total livestock units/Total utilised agricultural area (in livestock units/ha)

11) Calculation: (Farm Net Value Added - "premiums")/Total utilised agricultural area (in €/ha)

12) Calculation: Total subsidies on crops/Area of cereals, oilseeds and other premium area (in €/ha)

13) Premiums for livestock have also been tested as a relevant variable, but this data is not significant for the group of specialised crop farms. It still has to be mentioned that the level of premiums for livestock even for specialised crop farms was on average €120 per ha in the period 1993 to 1999.

14) A system in logs will be presented on the base of EUROSTAT data. There elasticities can be derived directly from the regression coefficients.

zero (for example ha-premiums) or even negative (for example income in some regions and in specific years). The estimation is done with ordinary least squares (OLS), while the significance test of the regression coefficients (z-stat) is calculated using estimates of a Spatial Correlation Consistent (SCC) covariance matrix from panel data (DRISCOLL and KRAAY, 1998).

The selected exogenous variables explain 35 % of the variation in the rental price (Tab. 1). A relatively low proportion of own-land on farms means on the contrary that a relatively high supply of rental land is available. A higher rental share therefore indicates lower rental prices, which is the cause for the negative sign of the regression coefficient. In regions with a higher **livestock density**, the rental prices are higher than in others (positive regression coefficient). As expected, the signs of the coefficient for **income** and the **crop premium** variables are positive, which means that an increase in both variables would be expected to lead to higher rental prices, while lower values of these both variables could decrease agricultural land rental prices.

Due to the contrasting development of income and premiums, their effects on rental prices have almost compensated each other. The political intention in the CAP reforms is to compensate income loss by premiums. While the level of the ha-premiums has reached a rather stable level of €390 to €440 per ha, it is rather difficult to determine exactly the change in income, because average income dropped year by year (except for 1994). From 1992 to 1999 income decreased by €238 per ha. Therefore it is not very surprising that the regression coefficient for income is higher than for ha-premiums.

Table 1: **Regression results on FADN data** (panel data from 53 regions, specialised crop farms; 1989 to 1999)

Dependent variable: rental price of agricultural land (deflated) rV1Rent
R Bar **2 0.3549

Independent variables	Coefficient	t-stat	z-stat*
1. Constant	88.84	8.51	17.64
2. V2Rental Share	-62.95	-4.71	-14.58
3. V3Livestock per ha	271.92	13.52	10.04
4. rV4Income	0.0988	9.71	12.20
5. rV5Crop Premium	0.0698	4.42	6.53

583 observations. *) The z-stat is calculated using estimates of a Spatial Correlation Consistent (SCC) covariance matrix from panel data (DRISCOLL and KRAAY, 1998). The regression coefficients are all significant at least at a 5 % error level.

Summing up, the regression results indicate a combined effect of recently introduced ha-premiums, increased livestock density and a higher rental share on prices for rented land. To address the contribution of the individual variable to the change in the price of rented land, the product of the "change in the value of the explaining variable" times "the regression coefficient of the variable" is calculated. Because one-year changes can be misleading, 3-year average changes should give more reliable information. In the following the periods before the introduction or at the beginning of the ha-premiums (in 1993) are compared with the time period from 1997 to 1999, when the premiums have been established (Tab. 2). Compared with the actual average rental price in the years 1997 to 1999, the rental prices have been lower in all three-year-periods, except in 1992 to 1994 (€0.79) and in 1993 to 1995 (€2.02). According to the regression analysis the rental prices increased in the three-year average 1997 to 1999 compared to the periods

1991 to 1993 (€4.40) and 1992 to 1994 (€3.54). This is a slight difference, but in general it shows that the tendency of price levels for rented agricultural land in real terms was decreasing in all periods, except for the time period shortly after the introduction of crop premiums. Before and after this period (1993 and 1994) deflated rental prices showed a tendency to decrease. The effect of the ha-premiums (in combination with the income reduction) could be described at least as a temporary effect on the price level of rented agricultural land. In a broader view they also could be seen as stabilising prices for leased agricultural land and prices for agricultural land in the longer run.

Table 2: Isolated effects (€per ha) of individual variables on the levels of the price of rented agricultural land as a comparison of different three-year-averages and the actual difference of rental price in these time periods

Three-year-average 1997 to 1999 compared to the three-year-average						
Effects of*	1989 to 1991	1990 to 1992	1991 to 1993	1992 to 1994	1993 to 1995	1994 to 1996
V2RentalShare	-3.68	-3.25	-2.68	-2.20	-1.78	-1.42
V3Livestock per ha	2.97	5.42	7.20	7.37	8.02	5.45
rV4Income	-37.63	-29.83	-21.93	-15.36	-11.85	-9.59
rV5CropPremium	27.32	26.74	21.81	13.73	4.07	-0.71
Sum of calculated effects on rental price	-11.02	-0.93	4.40	3.54	-1.53	-6.27
Actual difference of agricultural land rental price between the two three-year-average values	-6.89	-4.88	-0.50	0.79	2.02	-1.52

* Calculation: Difference in three-year-average variable level value times the regression coefficient in Table 1, ex: ((avg. 1997 to 1999) - (avg. 1989 to 1991)) * regression coefficient.

Source: FADN, own calculations

2.3 In-sample simulations on FADN data base

The following in-sample simulations for the period 1989 to 1999 have the objective to show the model quality in ex-post forecasts by comparison with the historical data (as an average of the panel data). They can also give some information about the isolated effect of the introduction of the crop premiums, when the value of this variable is kept at its 1992 level.

The first "in-sample simulation" shows the development of the rental prices when the actual deflated values of ha-premiums, as reported by FADN for specialised crop farms, together with the actual values of the other independent variables are assumed for the regression. The result shows maximum differences of 6 % in 1989 and -8 % in 1992 between actual and simulated rental prices (Fig. 3). In all other years the deviation is less than 3 %. In 1999 the simulation reaches a 2.7 % lower level for the rental price than the actual level of this year.

To show what proportion of the ha-premiums went to land owners outside of the agriculture sector, the second in-sample simulation "no ha-premiums" is calculated. It is done with no increase in ha-premiums after 1992. Under the latter variant, the rental prices would have stayed at a level about €25 per ha lower. In other words, the rental price would have decreased about 16 %. With the premiums a share of about 6.5 % of the ha-premiums went to persons renting out land, who are mostly non-farmers.

Viewed in the eyes of economists, this transfer of about 6.5 % of the ha-premiums to landlords seems to be relatively small. An under-estimation can be due to the limitations of the data source and the one-equation model. Therefore it is appropriate to analyse the more comprehensive EUROSTAT data. Further prospects for the development of rental prices according to the regression equation on the basis of FADN data will be discussed in chapter 4.

In-sample simulations showing the development of prices for rented agricultural land (in real terms, €per ha) with and without ha-premiums from 1993 onwards

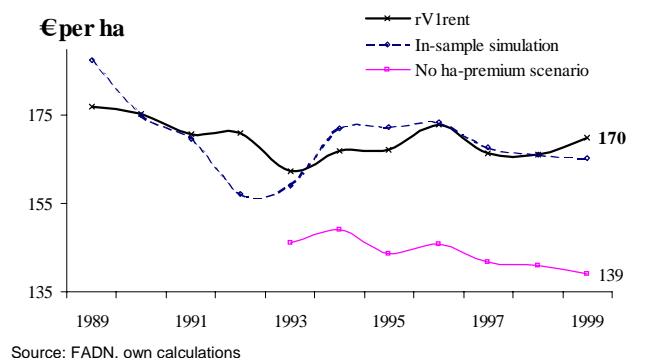


Figure 3

3 EUROSTAT Data and Results

EUROSTAT prices for agricultural land and prices for rented agricultural land for five EU countries (B, DK, D-W, F, NL) have been used for this analysis¹⁵. As a measure for the ha-premium the average premium for soft wheat in € per ha in the relevant country is taken. The proportion of cultivated own land is available every other year. By interpolation the corresponding rental share is calculated. Additionally, the deflated price index for agricultural products is used. This variable represents changes in income support by market measures in the CAP, which mostly reflects the decreasing income potential from market revenues. Other variables which have been tested, but not used in the following equation system, are the deflated gross value added¹⁶, the deflated development of subsidies¹⁷ and the deflated gross domestic production. All the variables are on a country level.

Development of the land prices

The deflated land prices¹⁸ in the selected five countries show a peak in the late 1970s and early 1980s (Fig. 4). After a period of stagnation or even decreasing land prices, the prices recovered in most countries at the end of the 1990s. Over the whole period from 1975 to 1999 the deflated land prices showed a decreasing trend in four countries (B, DK, D-W, F). Only in NL did they show an increasing tendency.

The average land prices per ha, in real terms, have been highest in NL (€20,981), followed by D-W (€19,660), B (€15,201) and DK (€9,010). In F the price level was lowest with €4,782.

15) Excluded have been irrigated land and corresponding non-irrigated land, countries with missing data in the period 1975 to 1999 and Luxembourg

16) Source: Economic Accounts for Agriculture (EAA).

17) Source: Economic Accounts for Agriculture (EAA)

18) GDP deflator (1995 = 100)

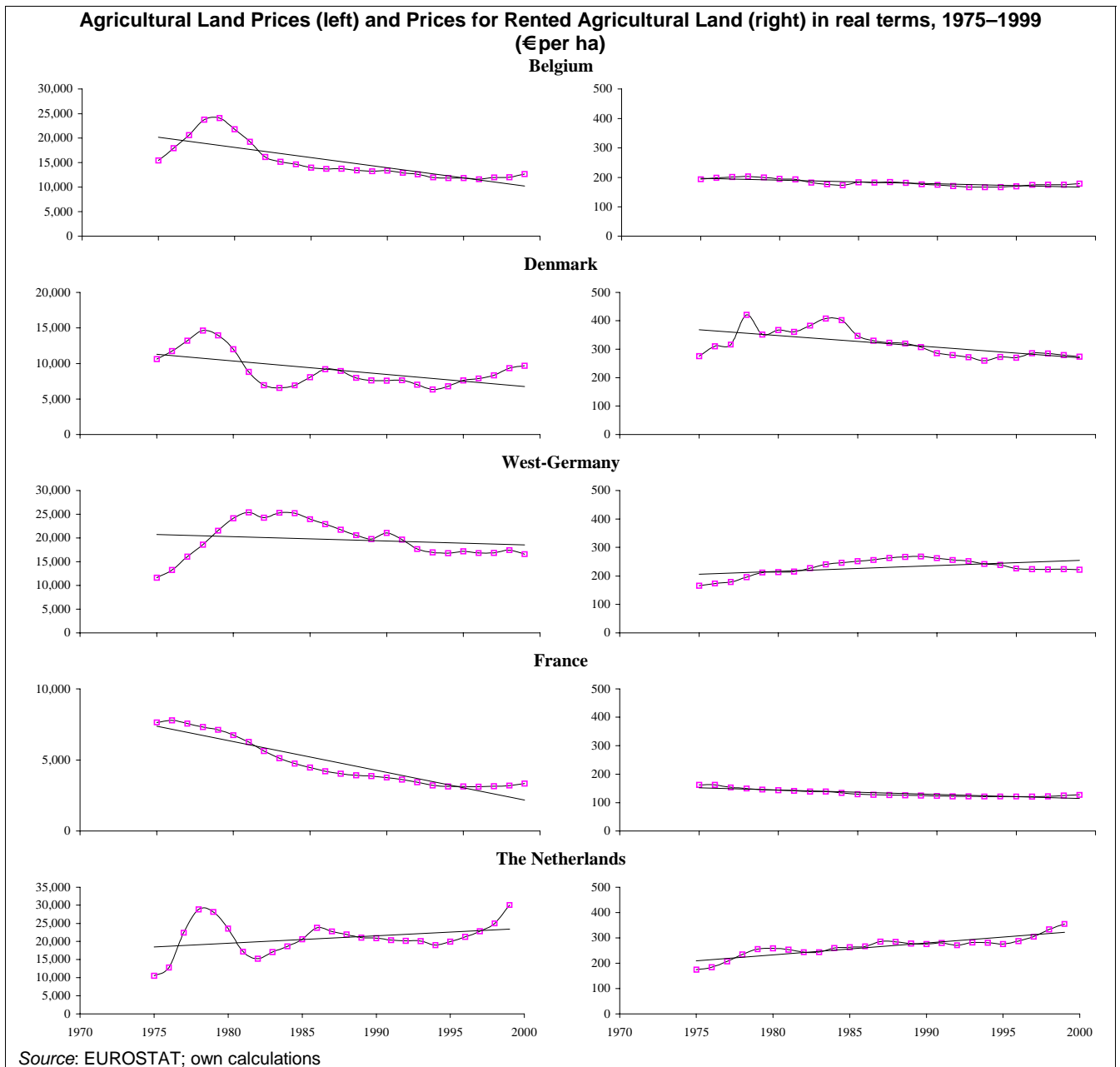


Figure 4

Development of prices for rented land

The deflated rental prices follow a negative trend in B, DK, and F, while rental prices increased in the long term in D-W and NL. Average deflated rental prices per ha were highest in DK (€319), followed by NL (€265), D-W (€229) and B (€181). In France the lowest prices were also observed for this variable, with €133 per ha on average for the period 1975 to 1999.

Share of Rented Land

The share of rented land differs considerably among the selected countries. The highest average proportions, with more than 50 %, were in Belgium (70 %) and France (55 %), while the Netherlands (37 %) and Denmark (18 %) have the lowest values. A considerable increase in rental shares occurred in France (+17 % in 25 years) and Western Germany (+20 % in 25 years), while the values for Belgium

and the Netherlands show a decrease. On average for the selected five countries, the share of rented land increased from 41.8 % in 1975 to 47.3 % in 1999 (Fig. 5).

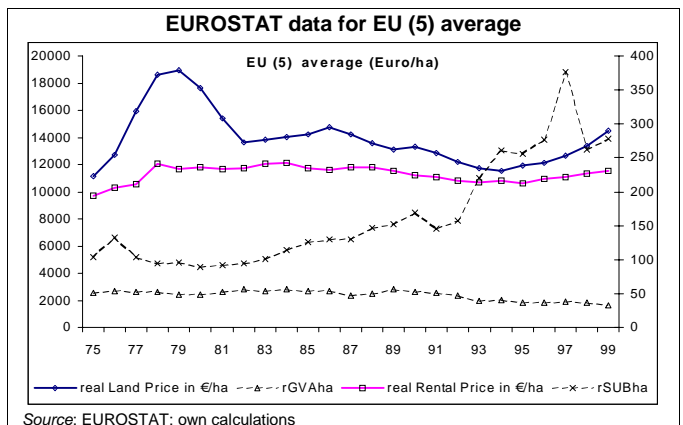


Figure 5

3.2 Regressions results on EUROSTAT data base

The panel data of the five countries over 25 years (1975 to 1999) provides 125 observations. A VAR-like¹⁹⁾, two-equation system was selected to specify the interactions between land price and rental price and to determine the exogenous influence of policy changes due to reforms of the CAP and the structural change in agriculture (the latter should be covered by the rental share and its change). Endogenous variables are the price for agricultural land and the price for rented agricultural land, both deflated and in logs. As exogenous variables the rental share, the deflated price index for agricultural products and the ha-premium were selected. The following equation system in logs is specified :

$$(1) \ln rPrice = a_{11} \ln rPrice_{t-1} + a_{12} \ln rRent_{t-1} + a_{13} \ln RSh \% + a_{14} \ln AgPriceIndex + a_{15} rHa-prem_{t-1}$$

$$(2) \ln rRent = a_{21} \ln rPrice_{t-1} + a_{22} \ln rRent_{t-1} + a_{23} \ln RSh \% + a_{24} \ln AgPriceIndex + a_{25} rHa-prem_{t-1}$$

with: Price = price for agricultural land, Rent = price for rented agricultural land, RSh = share of rented land in percent of total utilised agricultural land, AgPriceIndex = deflated price index for agricultural products, Ha-prem = Ha-premiums (soft wheat), r = in real terms, ln = logarithms, t-1 = time lag one.

All variables, except for rental share have been deflated. The values for the variable ha-premium could not be converted to logs because until 1993 the values were zero. The coefficients and significance tests (t-stat and z-stat) are given in Tab. 3. All the regression coefficients are significant at least at the 5 % error level.

The regression coefficients of the endogenous variables are all positive except for the rental price with lag one in equation (1). This means that an increase in land prices would produce delayed increases in both land prices and rental prices, while an increase in rental prices is followed by a delayed increase in rental prices itself and a delayed decrease in land prices. Changes in the share of rented land, which could be caused by further structural change in farm size, has a reversed effect on the prices of agricultural land for sale and for rent. A decrease in the support level of agricultural product prices would also decrease land prices and prices for rented land. Finally, the increase in ha-premiums supported the price levels of both endogenous variables with a delay of one year.

Table 3: Regression results for the equation system based on EUROSTAT data (panel data from B, DK, D-W, F, NL ; 1975 to 1999)

Dependent variable	Y1 = ln rPrice R Bar**2: 0.9636 Durbin-Watson Statistic: 1.54			Y2 = ln rRent R Bar**2: 0.9615 Durbin-Watson Statistic: 2.42		
	coefficient	t-stat	z-stat*	coefficient	t-stat	z-stat*
1. ln rPrice _{t-1}	1.043950	49.71	44.58	0.043643	4.78	3.59
2. ln rRent _{t-1}	-0.138413	-3.20	-1.93	0.890990	47.45	36.93
3. ln RentalShare %	-0.084051	-3.37	-2.83	-0.062959	-5.83	-4.44
4. ln Ag. Prod. price index defl.	0.132533	3.05	2.09	0.085849	4.55	4.80
5. rHa-premium _{t-1}	0.000344	3.66	4.68	0.000180	4.41	5.60

Usable observations 120. * The z-stat is calculated using estimates of a Spatial Correlation Consistent (SCC) covariance matrix from panel data (DRISCOLL and KRAAY, 1998).

Impulse-Response-Functions show the effects of an impulse²⁰⁾ on a variable at one point of time and the responses of the other endogenous variables during a longer period, here 25 years. An impulse on the price for agricultural land has relatively small long-term effects (11.7 % increase after 14 periods) and in the long run rental prices will follow marginally (by about 4.3 %) (Fig. 6). The responses of an impulse to rental prices diminish in time for this variable itself (to zero after 13 periods) and the land price declines (by 6.3 % in period 25). The decline of land prices after an impulse on rental prices could be explained by a change in the priorities: an increased interest in renting land could reduce the demand for land to purchase.

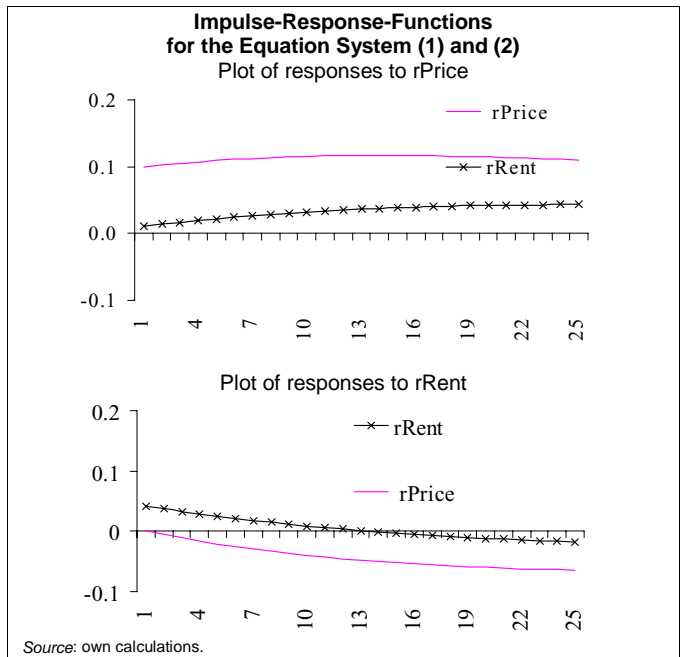


Figure 6

3.3 In-sample simulations on EUROSTAT data base

Again, as seen before for FADN data, the estimated model should be tested in-sample to show the accuracy according to the actual data and to isolate the effects of the ha-premiums on the dependent variables. The in-sample simulations (Fig. 7) start in 1975, 1980 and 1990, and provide one, two, etc. step-ahead forecasts, using the actual values for the exogenous variables. It is obvious that the model is not able to follow the actual development especially for the time series "land price" during periods of larger fluctuations as observed between 1975 and 1985. For the other periods and for the other endogenous variables over the total observation time, a better forecast quality can be observed.

As already discussed before, it is of interest to what extent the ha-premiums have been transferred to non-farming persons. As explained in chapter 2.3, again two simulations, one with and one without ha-premiums, can show what difference could occur in the price levels for agricultural land and for rented agricultural land (Fig. 7). Without ha-premiums, the land price in real terms could have decreased on average to about € 8,100 per ha (1998) to € 7,500 per ha (1999), which would have been a dramatic change which has to be interpreted with care. The change in rental prices

19) Vector auto-regressive

20) Measured in standard variations

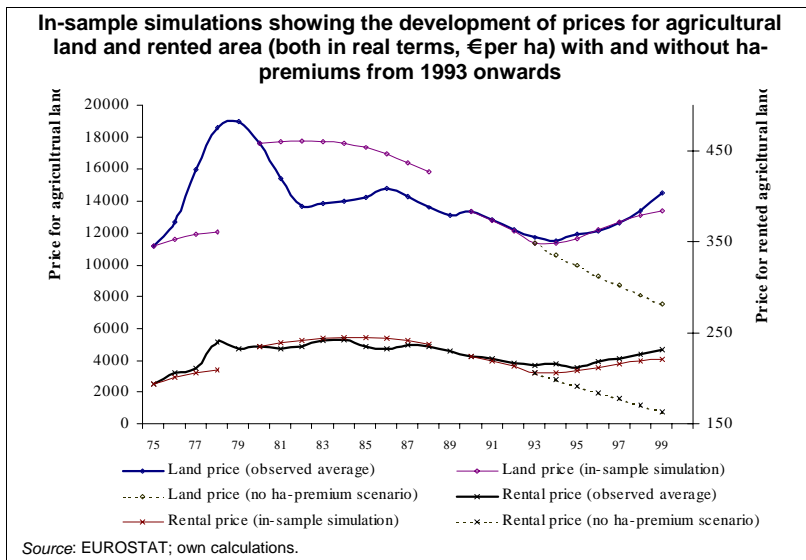


Figure 7

would have reached dimensions of € 48 to € 58 per ha compared to the in-sample simulation in 1998 to 1999 and rental prices would have been decreased by 28 % to 35 % in these two years. In other words, the land owners, who lease agricultural land, got a share of about 15 % to 18 % (1998 to 1999) of the ha-premiums. This would be more than double the share calculated before on the base of FADN data. Therefore, the absolute figures should again be interpreted with care. Most importantly, there seems to be no doubt that some part of the ha-premiums have been transferred to the non-farming sector.

Table 4: Cereal-relevant measures of CAP reform

1992 reform	Agenda 2000	Mid-term Review
Price	-33 %	-15 % -5 %
Premiums	€54 per tonne -18 %	€63 per tonne

¹ 20 % for modulation less compensation for price reduction (In the Mid-term Review it is proposed to compensate the reduction of intervention prices, as provided for in Agenda 2000).

Source: EU-Commission (simplified)

4 Ex-ante simulations – assumptions and results

The policy changes and their economic implications up to the year 1999 have been covered by the observed available data. For the ex-ante simulation part it is of interest to give a picture of what effects further policy changes could have on the land markets. The price changes and the ha-premiums of cereals will be used as indicators for further policy change. Relevant policy changes within the framework of the Agenda 2000 are: “the intervention price for cereals will be cut by 15 % in two equal steps of 7.5 %, starting in the 2000/01 marketing year” and “direct aid, .., will be increased from €54 per tonne to €63 per tonne”²¹). In the Mid-term Review, for the cereal sector another intervention price reduction of 5 % is proposed²²), while the set-aside measure should be maintained. In the dynamic modulation scheme all direct payments will be reduced progressively in

21) Source: <http://europa.eu.int/scadplus/leg/en/lvb/l60007.htm>, 4.09.2002.

22) Source : http://europa.eu.int/comm/agriculture/mtr/comdoc_en.pdf, p. 13, 4.09.02.

arithmetic steps of 3 % per year to reach 20 %²³). The reallocation of these funds is bound to safety aspects, environmental objectives and rural development, so at this point it is assumed that ha-premiums will decrease and benefits of the so called “second pillar” will not necessarily support the same farmers who lost in the “first pillar”.

The following ex-ante simulations try to specify the effects of the further CAP reform measures which occurred after 1999. The simulations are presented for a 10 year period, up to 2009. The reference “continuation scenario” assumes that the (economic) situation in 1999 would continue, only the share of rented land would increase in the same manner as observed over the preceding years. An alternative scenario considers the further CAP reforms from 1999 onwards: Agenda 2000 and the Mid-term Review proposal of June 2002.

4.1 Ex-ante simulations on average FADN data

The reference “**continuation scenario**” takes over the situation in 1999 and keeps the variables at constant levels, except for the rental share. It is assumed that the structural change, which is responsible for the change of the rental share, will continue at the same rate as in the past. The presumed rental share would then increase at an annual rate of 0.7 %, as was observed during 1989 to 1999, and increase from 56.8 % in 2000 to 63.1 % in 2009. The livestock density is kept at 0.21 livestock units per ha, the income level at €257.3 per ha and the level in crop subsidies at €403.1 per ha. The expected rental price would be €164.8 per ha in 2000, with a tendency for a minor decrease, down to the level of €160.8 per ha in 2009 (Fig. 8). A slight decrease of about 2.5 % over a decade could be expected.

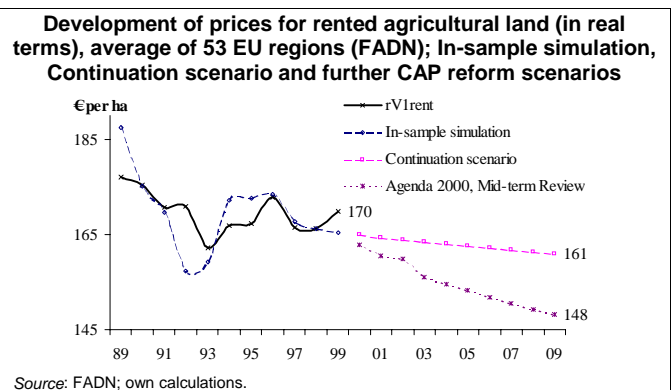


Figure 8

For the scenario “**Agenda 2000, Mid-term Review**”, additional assumptions are introduced. According to calculations which take account of the Agenda 2000 regulations, the income variable is reduced by €45 per ha in 2000 and again in 2001 and by €25.5 per ha in 2003. Additionally, the crop premiums are increased in 2000 and in 2001 by

23) Source : http://europa.eu.int/comm/agriculture/mtr/comdoc_en.pdf, p. 22, 4.09.02.

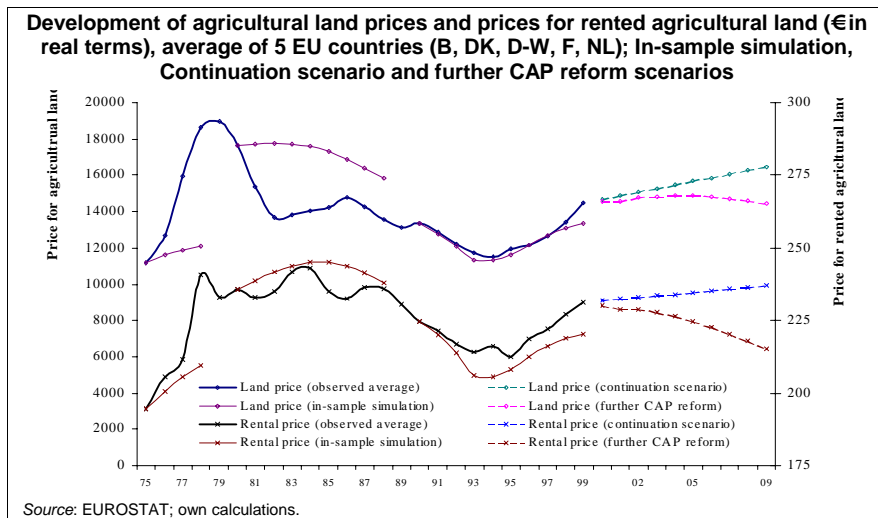


Figure 9

8.3 % and then decreased according to the Mid-term Review proposal in the period between 2003 and 2009. The expected rental price would be €162.7 per ha in 2000, with a decreasing tendency down to a level of €148.2 per ha in 2009. Under the influence of further CAP reforms as already realised by Agenda 2000 and as proposed by the EU-Commission in its Mid-term Review, the rental prices should decrease to a larger extent (9.8 % in the period 2000 to 2009). It has to be reminded that these figures are in real terms, so nominal values could show at least stagnation or even an increase in rental prices for agricultural land.

4.2 Ex-ante simulations on average EUROSTAT data

The reference “**continuation scenario**” again takes the situation of 1999 and keeps the variables at constant levels, except for the rental share, which increases at an annual rate of 0.2 %, as was observed during 1975 to 1999, and which therefore increases from 46.5 % in 2000 to 49.3 % in 2009. The price index of agricultural products is kept at 69.3, the ha-premium at €315 per ha. The expected land price would be €14,678 per ha in 2000, with a tendency to increase up to the level of €16,478 per ha in 2009. The expected rental price would be €231.9 per ha in 2000, with a tendency for a minor increase to the level of €237.0 per ha in 2009 (Fig. 9).

For the scenario “**further CAP reform scenarios**” (Agenda 2000 and Mid-term Review), additional assumptions are introduced. According to calculations which take account of the Agenda 2000 regulations, the variable price index of agricultural products is reduced by 7.5 % in 2000 and again in 2001 and by 5 % in 2003. Additionally, as already described before, the ha-premiums are increased in 2000 and in 2001 by 8.3 % and then decreased according to the Mid-term Review proposal in the period between 2003 and 2009. The expected land price would be €14,527 per ha in 2000, with a decrease down to the level of €14,431 per ha in 2009. The expected rental price would be €230.3 per ha in 2000, with a tendency to decrease slightly to the level of €215.2 per ha in 2009.

5 Assessments for countries in the transition process

In order to estimate probable effects of accession on land

prices in the new member states of the EU, the transition in Eastern Germany has been analysed. The transition process in Eastern Germany has been going on now for more than a decade. A land market has developed and reliable data on land markets is available. Due to this, the attempt is made to apply the previously presented two-equation system to the Eastern German data.

In Germany the land markets are clearly divided into Western Germany, a market with high rental prices (€221 per ha in 1999) and land prices (€16 530 per ha in 1999), and Eastern Germany, a region with lower price levels (rental prices near €100 per ha and land prices of about €3420 per ha in 1999), even if one takes into account that in some

regions of Eastern Germany the soils are of poor quality. The first adjustments on the land market seems to yield relatively high land prices in the early 1990s. This high price level had been corrected downwards (-38 % in real terms), while the rental prices increased by 13 % in real terms between 1992 and 1999 (Fig. 8). The reasons for these phenomena are manifold²⁴). In short:

- **Western Germany** has a more marginal market, where one of the reasons to buy land are savings on income taxes after selling previously owned land for settlement purposes.
- **In Eastern Germany** a land market could be established after the reunification in 1990, but the state still holds huge areas of land. In 1990 the Treuhandanstalt managed an agricultural area of 2,1 Mio ha which corresponds to about 38 % of the East German total agricultural area. The rental price was determined in the beginning at €2 per soil point, i.e. according to soil quality, measured by a maximum of 100 points. This corresponds to about 100 €/per ha for medium quality land.
- Furthermore the private land was restored to the (former) owners, most of whom retained some land and rented it to the remaining large farms. Only a few land owners started their own farming operations, so at the end of 1990 the rental share was nearly 90 %.
- The rental prices have been determined mainly from a total profitability calculation and not from a marginal profit calculation, as is often appropriate in Western Germany.

All in all, the rental prices in Eastern Germany are catching up with those in the west, while the land prices are still kept low due to the “special land sale programme”²⁵) of the state, where most of the agricultural land still held by the state is being sold at specially reduced prices.

The time series for the Eastern German case are too short to estimate a specific regression model. Because the agri-

24) For more detail see: DOLL, H. (2001) Zur Entwicklung von Pacht und Kaufpreisen für landwirtschaftliche Flächen in Ostdeutschland. FAL-Braunschweig.

25) Sale of former « volkseigener » agricultural area at special conditions on the basis of EALG (Entschädigungs- und Ausgleichsleistungsgesetz) of 1994 and of the Flächenerwerbsverordnung of 1995.

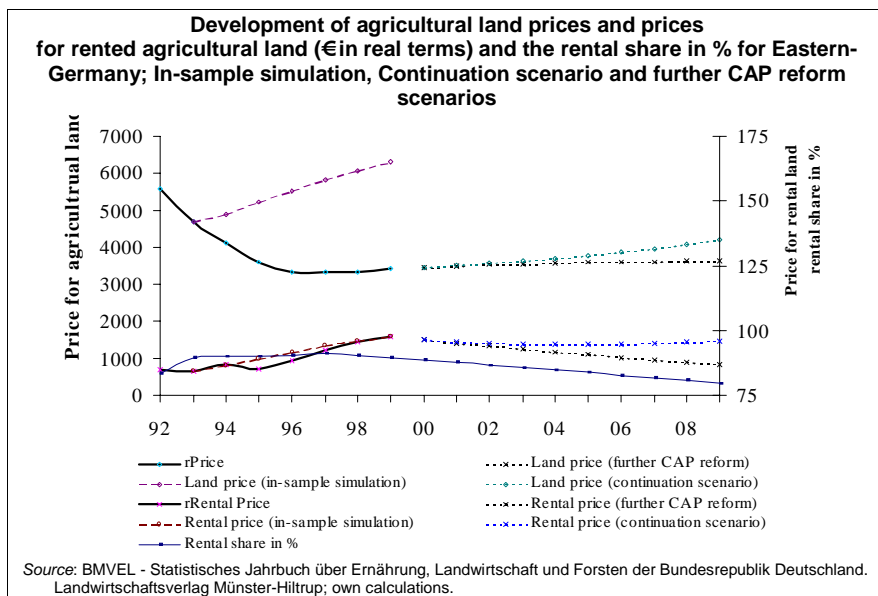


Figure 10

cultural sector of this region is part of the CAP, it is appropriate to apply the two-equation system, which was estimated on EUROSTAT data, to assess the development on the Eastern German land market. The “**in-sample simulations**” beginning in 1993 show that according to the regression model, a higher price level would be expected for land to buy. With an increased share of rented area (increasing from 84 % in 1992 up to 91 % in 1996) and with the reduced price index for agricultural products, the forecasts beginning in 1999 show a better adaptation to real land price development. The in-sample simulation for the rental prices predicts a development which is obviously appropriate in its trend and in the value level (Figure 10).

For the “**continuation scenario**” and the scenario of “**further CAP reforms**”, a decrease of the rental share of 1 % p.a. as observed in the late 1990s is assumed. All the other assumptions stay the same as described in chapter 4. In the continuation scenario it is expected that land prices would increase about 22 % from the 1999 level within one decade. The rental prices stay more-or-less at the same levels. Due to the changes in price levels for agricultural products and decreasing ha-premiums, in the further CAP reform scenario the land prices would only increase by about 6 % and the rental prices by about 11 % within a decade, compared to the 1999 figures.

In the framework of the transition process of countries which formerly had centrally-planned economies and in the process of EU enlargement, a land market has or will be developed in these countries. With their integration in the CAP, the farmers in these countries either already receive ha-premiums, as in Eastern Germany, or will receive ha-premiums in the future. Price levels for agricultural land or for rental land in most of these countries are much lower than in the EU Member States.

In general, land as a production factor cannot be transported, it can be expected that the price transmission effects are relatively small. Even if effects in absolute figures are smaller, the relative changes due to modified framework conditions can be similar. Thus, the CAP can well be expected to have implications for the land prices and the

rental prices for agricultural land in all affected countries. This analysis should be updated when more recent data becomes available, using longer time series and perhaps expanding the number of countries examined.

Reference

- DRISCOLL, J.C. KRAAY, A.C. (1998): Consistent-Covariance Matrix Estimation With Spatially Dependent Panel Data. *Review of Economics and Statistics*, November, pp. 549-560.
- Doll, H. (2002) Zur Entwicklung auf den landwirtschaftlichen Bodenmärkten in den neuen und alten Ländern. <http://www.bal.fal.de/>
<http://www.estima.com: RATS® Software package>
- RYAN, J.; BARNARD, C.; COLLENDER, R. (2001): Government Payments to Farmers Contribute TO Rising Land Values. *Agricultural Outlook*, Economic Research Service/USDA, June-July 2001, pp. 22-26.

Data sources:

- Farm Accountancy Data Network (FADN).
EUROSTAT.
European Commission, DG AGRI.
BMVEL, Bonn/Berlin: Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten der Bundesrepublik Deutschland. Landwirtschaftsverlag Münster-Hiltrup, verschiedene Jahrgänge.

Author: Prof. Dr. CLEMENS FUCHS, Fachhochschule Neubrandenburg, Postfach 110121, D-17041 Neubrandenburg, Telefon: (03 95) 5 69 32 05, Telefax: (03 95) 5 69 32 99 (E-mail: cfuchs@fh-nb.de)

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