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DETERMINANTS OF FARMLAND PRICES IN GERMANY

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1. Introduction

Understanding land price determinants has long been a concern to agricultural economists (Scharlach and Schuh 1962; Tweeten and Martin 1966; Clonts 1970). The origins of land price discussions can be traced to von Thünen. Current interest in how agronomic and other factors influence agricultural land price is related to availability of agriculture land to sustain agribusiness industry, valuing land assets to secure farm credit financing, and assessing agricultural land demands as an inflationary hedge (Niendieker 1987).

Valuing land is a critical issue for farm credit, especially during periods of agricultural reform. If banks determine the loan availability for agricultural land primarily on the basis of the land's its value (agronomic characteristics and commodity price levels), agro-political reform could influence land value estimates, bank loan procedures, and, consequently, farmers' access to credit for land purchases. To the extent that non-agricultural factors are incorporated into agricultural land valuation, agro-political reform could lose its impact on land price estimates, and in turn farm credit availability.

Farmland price studies have used a variety of methods and data from the United States, Canada, and Argentina. Most of the research has been conducted in countries characterised by relatively free land markets. In addition, these countries have large rural areas where agricultural production occurs as a primary activity. Analysis of farmland prices in countries characterized by small geographic area, high population density, limited rural area, and regulated land markets has been less common. Consequently, the relative importance of agricultural and non-agricultural actors in determining farmland prices in these countries is not well understood. Population settlement patterns, agricultural land availability, farm-processor transportation costs, and processor dependence on

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imported commodities suggests farmland prices should be determined by factors associated with lands potential for conversion to higher value uses.

Farmland prices vary considerably across the Federal Republic of Germany (Statistische Landesaemter, various issues, Agrarbericht 1988), a country that has attributes that would suggest the potential for conversion of agricultural land to a higher value use would be capitalized into its price. This study analyzed farmland prices in Germany to assess the relative importance of farm and nonfarm factros on land prices, and to examine whether different factors are associated wthjimprotance examined what influences these prices in Germany. The analysis estimates a cross-sectional, county-level, Hedonic model to evaluate the influence of agronomic and nonfarm attributes on farmland prices. A farmland rent model also is estimated to examine the influence of agronomic and nonfarm attributes on rents. The first section of the article presents an overview of farmland price analysis literature. A conceptual model and data for analyzing farmland prices are then presented, followed by a discussion of the results.

2. Related Literature

A number of studies have examined farmland prices, predominently in North American farmland markets. Shi, Phipps, and Colyer (1997) classify these studies as either those that focus on agricultural income as a potential determinant of farm land price or studies that use primarily nonfarm factors as determinants of farmland prices.

The influence of agriculture on land prices has been widely examined (Barnard 1997, Burt 1986, Chavas and Shumway 1982, Castle and Hoch 1982, Herdt and Cochrane 1966, Lloyd, Rayner and Orme 1991, Palmquist and Danielson 1989, Sogaard 1993). An Organization for Economic Co-operation and Development (OEDC) report, "Adjustment in OEDC Agriculture Agriculture: Reforming Farmland Policies," examines the influence of agricultural support programs on agriuclagricultural land prices. This research has used agronomic characteristics, land rents, and agricultural structure variables as determinants of farmland prices. These studies have found farm returns, farm size, expected capital gains, capitalized policy benefits, and interest rates influenced farmland prices.

Fewer studies analyzing the impacts of non agricultural factors on farmland prices (Chiocoine 1981, Clonts 1970, Colyer 1978, Dunford, Marti, and Mittelhammer 1985, Folland and Hough 1991, Husak 1975, Husak and Sadr 1979, Shonkwiler and Reynolds 1986, Shi, Phipps, and Colyer 1997). However, this research suggests that location, population density, highway access, and the value of non farmland influence farmland prices. Generally, these studies found factors associated with a higher

likelihood of converting agricultural land to a higher value have a positive influence on agricultural land prices.

Klare and Peters (1980) analyzed the rapid rises in German farmland prices in the 70s. They concluded that prices were influenced by land's value as a factor of production, and also for its value as an investment or means of storing wealth. Other research (Höper, 1985) suggests the impacts of German agricultural policies are capitalized into farmland prices. Niendieker (1987) analyzed factors influencing farmland price changes from 1974 through 1986 and found regional factors, farm income, and the number of land transfers were the primary determinants of price change. He concluded that agricultural land prices are mainly influenced by nonagricultural influences. Schroers (1990) examined farmland prices in the state Schleswig-Holstein with a variety of analytical methods. His results suggest that a few variables explain the price of development land and that transfer-function-models have the best fit. Other studies have evaluated the impact of farmland's rising market value on its used for loan collateral and its affect on farmers' investment behavior, farm structure, farmland prices, and profit margins (Becker 1981). Studies also have examined the role of the land privatization agency (BVVG) in the eastern Germany's land market (Doll and Klare 1994 and 1995, Hagedorn and Klages 1994, Klare 1992).

Research has improved the general understanding of agricultural land prices in Germany, but has provided little insight into how agronomic and community factors influence prices. The next section of this paper builds on the farmland price literature and information about farmland in Germany to construct a model used in analyzing the farm and non-farm determinants of farmland prices in Germany.

3. Conceptual Model

Land is a resource used as a factor in various activities, agricultural production as well as many other production processes. Land's value, or price, is differentiated on the basis of its production attributes for agricultural as well as other activities and, therefore can be modeled as a market for differentiated factor of production (Palmquist asnd Danielson 1990). In rural areas where agriculture dominants land use, it can assumed that agriculture is land's highest value use and that prices are not influenced by demand for its use in urban activities. Land prices, or farmland prices, are modeled a function of the land's attributes for agricultural production Chavas and Shumway 1982).

A hedonic price model is used to estimate the implicit value of the land characteristics. Hedonic indices (Grilches and Rosen 1971) have been used extensively to impute the value of agricultural land attributes in farmland prices (Miranowski and Hammes 1984; Palmquist and Danielson 1989; Herriges,

Barickman and Shogren 1992; Roka and Palmquist 1997). Hedonic indices also have been used to analyze the importance of farmland attributes for production of different agricultural products, such as beef and milk (Gillmeister, Yonkers and Dunn 1996; Richards and Jeffrey 1996).

Hedonic pricing suggests the prices of heterogeneous goods are determined by the goods' quality characteristics. Therefore, this technique can be used to estimate implied values of individual characteristics farmland, a multi-attributed good used as a factor of production. Analyzing farmland prices in Germany, unlike rural Iowa, requires implicit prices of attributes or characteristics associated with the higher value use of land be used because the potential to convert farmland to a higher value production use is prevalent throughout Germany.

The hedonic approach assumes the market is in equilibrium with price determined by a function $P(Z_i)$ of characteristics. The implicit price of the k-th characteristic is given by $p_{ik} \equiv \partial P / \partial Z_{ik}$. P_i denotes the price for farmland charged for the i-th good (property) and Z_i the (kx1) vector of the k characteristics of the i-th good (farmland). The partial derivative of price with respect to the i-th characteristic yields the implicit marginal price of the i-th characteristics, the amount a marginal buyer has to pay to obtain one more unit of the j-th characteristic, *ceteris paribus*.

The price for farmland is comprised by a bundle of characteristics. Dunford et al. (1985) classified these characteristics into five categories that influence farm income and profitability: External economic and governmental influence; Expectations about future conditions; Buyer characteristics; Seller characteristics; and, Land characteristics. The price of farmland also in influenced by attributes that would signal potential for converting farmland to a higher value use, such as residential or commercial development. The analysis uses a hedonic pricing model with cross-sectional data from counties in 10 of Germany's 16 states to estimate shadow prices for factors that influences expectations about future conditions and land characteristics that influence potential for continued agricultural uses as well as conversion to a higher value land use.

Expectations about future conditions are of two general types. One type includes factors that impact the future of agriculture. For example expectations about the agriculture policy in the future or general business prospects. The other type includes factors related maintaining current farm use and/or the potential for converting farmland to a higher value activity, or non agricultural use. These factors include agricultural factors related to the size and structure of agriculture as well as factors related to the general economy like population growth and migration, residential construction, industrial development. Land characteristics include land's specific productivity attributes and factors that could influence land development.

The mathematical representation of the model is:

$$P = f(L, E) \quad (1)$$

where

P = price for farmland

L = a vector of agricultural attributes

E = a vector of attributes reflecting probability for land development

It is hypothesized that farmland prices are determined by characteristics of the farmland and other farm attributes, as well as non-agricultural factors related to expectations about the future of farmland for non agricultural use.

3. 1. Agricultural attributes

The value of farmland can be expressed as the discounted sum of the expected value of future yields, among other factors. Yields are dependent on soil type, climate and technology. Assuming technology is fixed in the short-term and that farmland has the same climate, farmland prices are influenced by soil attributes that influence yield potential. A positive relationship is hypothesized between soil attributes and farmland prices.

Farm structure is another factor which influences the farmland value (Tweeten and Martin 1966). Pressure for farm expansion increases farmland demand and raises expectations about potential returns to land investments. Additionally in countries like Germany which have limited land, government policy influences the structure of agriculture by restricting activity of agricultural enterprises not large enough to achieve various management practice requirements. For example, animal production enterprises are restricted by regulations associated with manure order management. Regions with high animal population densities, such as regions with concentrations of hog producers, may face higher farmland prices than regions with low animal densities because producers need access to additional land for waste management activities to be able expand animal production operations.

3.2. Non-agricultural attributes

Non agricultural attributes of farmland that influence its potential value of farmland are hypothesized to have a positive influence the farmland prices. These attributes are characteristics of the local economy that signal potential demand of land development activities. The higher the demand for land for development, the greater the potential for converting farmland to a higher value land use. This

potential is capitalized in the value of farmland.

However, local, state and federal law restricts land owners' ability to convert farmland to other uses. Regulation requirements and zoning restricting create uncertainty about owners' ability to convert farmland to other uses. Local government become the defacto supplier of development land as the entity providing market participants with permission to develop any particular land tract. Nevertheless, farmers and land speculators make subjective assessments government's granting of development rights, and these assessments are capitalized into the land price. The probability of development rights being granted is hypothesized to be positively associated with close proximity to urban areas, diversified economic structure, high population density and other attributes that influence demand for development land.

4. Empirical Model and Data

Data used in this analysis were obtained from the various publications of the statistical offices of different federal states in Germany. Mainly issues of the series 3, 5, and 11 are used (see references). The analysis uses 1996 county (*kries*) level data for all counties of 9 federal states. Seven states were excluded for the analysis. Three states were excluded because farmland price data were not available (Bavaria, Thueringen, and Saxony-Anhalt). Four other federal states were excluded because they have limited agricultural land (Berlin, Hamburg, and Bremen), or data for some of the independent variables were not available (Saarland).

Counties in the 9 study states that had less than 20 ha (50 acre) traded or fewer than 20 farmland sales transactions were excluded from the analysis (16 counties), as were counties which consist exclusively of urban land (78 counties/cities). In total 184 of the 278 counties in the 9 states were used in the study.

4.1. Dependent variable

The dependent variable, PRICE, is the average per hectare price paid for farmland sold in 1996. These data were obtained from series 3, number 2.4, statistical offices. The data are originally collected and reported by tax offices. Price data were obtained from the statistical offices.

Several types of transactions are not included in the farmland sales data. Sales of property for development, sales parcels that include land uses other than agriculture and have less than 90 per cent of total area devoted to agriculture, farmland sales associated with reparcelling (*flurbereiningun*) of the agricultural land of a community, repossessions and forced auctions, and property which transferred title due to death, a gift, or inheritance. All other farmland transactions are included in he data.

Farmland in north and northwest of Germany has the highest productivity. Descriptive statistics for the sales data are presented in Table 1. The average price of farmland varies considerably across counties. These differences still exist if we divide the sample into two sub-samples, western and eastern Germany. In general, average farmland prices by location increase from the north to the south of Germany, and from the east to west. Average rents per hectare by location, on the other hand, increases from south to north. This suggests that non-agricultural factors influence on farmland prices.

4.2. Independent variables

Data for explanatory variables were obtained from issue A-I, B-I, C-I, C-III, C-IV, M-I, M-II and KREISZAHLEN of the statistical offices. The names, definitions, sources and expected signs of variables are listed in Table 2. Descriptive statistics for each variable area presented in Table 3. Values for BARLEY, PIGS UNEMPLOYMENT are the averages of the years 94/96, for MIGRATION the average of 94/95/96 and for PERMITS the average of 95/96 have been used to avoid distortions due to the variability of these data between different years**.**

4.2.a. Agricultural characteristics

Five measures for agricultural characteristics are used, EMZ, BARLEY, PIGS, FARMS and AGRIAREA. EMZ is a measure of farmlands' productivity**.** EMZ measures the lands natural productivity due to the soil and climatic conditions, etc. EMZ calculations are based on the official soil productivity estimations established in 1935 (Statistische Berichte Schleswig Holstein, Mi7, p. 3, 1996). These estimates also provide the basis for taxation of the agricultural property. The higher the EMZ value, the greater the productivity of the land, and consequently, its potential yield. A positive relationship between EMZ and farmland price is hypothesized.

Regional variation in climate can influence farmland productivity with regard to specific crops, such as wheat and sugar beets. BARLEY, the per hectare yield for winter barley, is used as a productivity measure because it is not impacted as much by climate variation. Winter barley reflects the land's yield potential and does not over proportionately favor any particular location. Winter barley is grown throughout the study region. Higher yields are hypothesized to be positively associated with farmland prices.

Livestock density influences demand for agricultural land. PIGS, pigs per 100 hectare, is used as a live stock density measure. While pig production is not land intensive, producers need access to farmland for manure disposal. Expansion of livestock enterprises is limited by the availability farmland that would allow farmers to comply with fertilization/manuring regulations. It is hypothesized that in

areas with higher concentrations of livestock, the demand for farmland is higher, so livestock density is hypothesized to have a positive influence on farmland prices.

Agriculture structure is measured by the variable FARMS, the average size of farms larger than 50 hectare. The direction of this sign is not clear for this parameter. It can be argued that smaller average farm size puts upward pressure on price as farmers wishing to expand the size of their operations compete for land. This argument suggests a negative relationship between farmland price and average farm size. On the other hand, it could be argued that a county with small farms reflects a region characterized by part time farming and that the low average farm size reflects regional decline in the agricultural sector. As a result, the availability of farmland in these regions is relatively high. Agribusinesses generally need additional land to grow. Due to a farm's limited ability to diversify, individual farm enterprise growth occurs mainly through the expansion based on the acquisition of the additional farmland. This suggests a positive relationship between farm size and price.

The other agricultural variable included in the model is AGRIAREA, the share of agricultural land in the county. The higher the share the lower the pressure on farmland prices. A negative sign for this variable is expected.

4.2.b. Non-agricultural characteristics

The total area, AREA, represents the general availability of land. It is expected counties with large area have more land available, so *ceterus paribus*, farmland prices are lower.Therefore a negative relationship between AREA and agricultural land prices is expected.

Population density, POPDENSITY, serves as a measurement for the population pressure. The higher the density, the stronger the pressure to change farmland into non-farmland to satisfy the growing need for living space.

Next to the population density, population movements are also a contributing factor which reflect the population pressure. In the analysis, net population movements, MIGRATION, in the years 1994 to 1996 were considered. Many expectations of the future desirability of the region are based on these figures. It is assumed that increasing population movements will influence the prices of farmland positively.

The prices of development land in DM/ha., SITEPRICE, are considered for the years 1995/1996. The development land is considered as a whole along with land ready for development. A positive sign is also expected for this variable.

The number of building permits, PERMITS, are also included. The direction of the sign is in this case not clear. A number of building permits certainly expresses the desirability of a location and

with rising attractiveness on the side of residential interests, the prices of farmland would also rise. On the other hand, attractiveness means low development prices for people would like to build their own family house. In a cross-section analysis, a negative sign is to be expected.

The attractiveness of a location, especially in a rural region, is also determined by the presence of schools. As a rule, elementary schools and "Hauptschulen" are nearby, "Realschulen" are generally not too far away[2]. The "Gymnasium" are generally only found in larger cities and long travel times have to be figured in. the variable SCHOOL, the number of "Gymnasien" per capita, is used to measure access to high school education.

The unemployment figures (1994/1996) present a variable which serves as a measurement for the structural and income weakness. Especially in rural areas, the struggle against unemployment proves to be difficult and tedious. The unemployment figures therefore serve as a measurement which expresses future expectations of the economic situation and also the expected land development. It is expected the unemployment figures, UNEMPLOYMENT, are negatively correlated with the prices of farmland.

Next to the mentioned factors, a dummy variable, DUMMY, completes the spectrum of the clarifying variables. The conditions of the land market differ greatly between eastern and western Germany, despite the five years since reunification. For this reason, a dummy variable was added. Regions in western Germany are given a 1, regions in eastern Germany a zero.

5. Results

5.1. Farmland Prices

Regression results are presented in Tables 4. Model 1 analyzes the determinants of the price for farmland for all German counties. Models 2 and 3 estimate farmland prices for eastern and western counties separately. F-tests of the models find the results to be significant at the α 0,01 level. Model 1 has an f-value of 82.52; model 2 has a value of 50.85. Model 3 has a value of 3.46. Models 1, 2 and 3 have adjusted R^2 values of 0.84242, 0.80491 and 0.44441, respectively.

Pearson correlation coefficients for the independent variables for model 1 are all below 0,45 except for EMZ-BARLEY (0,56), SITEPRICE-POPULATION (0,707) and PERMITS-MIGRATION (0,54). The overall R^2 in the regression is greater than all individual R^2, an indicator that multicollinarity is not a problem (Greene 1997). All condition indices are below 30 and, since no variable has two or more variance proportion values of 0.5 or greater. Multicollinarity is assumed not

[2] In Germany secondary schools are divided in "Hauptschulen, "Realschulen", and "Gymnasien". The educational level

to be a problem (Judge et al 1985).

Pearson correlation coefficients for Model 2 variables are all below 0,45 except for SITEPRICE-POPULATION (0.7) and AGRIAREA-PIGS (0.456). No condition index exceeded 30 and no variables have variance proportion values of 0.5 or greater. Therefore, multicollinarity is assumed not a problem.

For model 3, eastern Germany, the results differ from the other two models. There are a number of significant correlation values greater than .5. In addition, two condition numbers exceed 30 and a variable has two variance proportion values of greater than 5. These results suggest that multicollinarity is a problem.

Ten variables in model 1, 9 variables in model 2 and 2 variables in model 3 are significant at the .05 level, all with the hypothesized signs. In model 1, 4 of the agricultural variables and 6 of non-agricultural variables are significant. In model 2, 4 of the agricultural variables and 5 of the non-agricultural variables are significant. In both models the agricultural variables EMZ, BARLEY, PIGS, and FARMS are significant and the non-agricultural variables POPDENSITY, MIGRATION SITPRICE, PERMITS and SCHOOL are significant. UNEMPLOYMENT is significant in mode 1. AGRIARFEA and AREA are not significant in either model.

The partial coefficients of determination indicate that that POPDENSITY, PIGS, SITEPRICE, EMZ and UNEMPLOYMENT are the major determining variables (model 1). In model 2 POPDENSITY, SITEPRICE and PIGS are the most important variables.

None of the agricultural variables are significant in model 3. Two non-agricultural variables, POPDENSITY and SITEPRICE are significant at the .05 level.

Agricultural factors influence farmland prices in Germany. Land productivity is capitalized into farmland prices. Soil quality and small grain productivity both have a positive influence on farmland prices. Farmland demand factors also influence farmland prices. Farmers who produce animals use cropland in manure management. Producers who wish to expand hog production are required to have access to crop land for waste application. Consequently, communities with higher levels of animal agriculture have higher levels of demand for land.

Development factors also are capilaized into the land prices. Non-agricultural factors that raise expectations about the demand for and value of land for non-agricultural activities influence land prices. Prices of development land, building rates, population growth and population density all signal development pressure and future demand for development land. Growth factors higher prices for land and suggest a higher rate of return to farmers who are able to sell their fram land for development. The

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increases from "Hauptschule" to "Realschule" to "Gymnasien".

expectation of the higher return is capitalized into the price of farmland.

The model for all German counties (model 1) and the model for counties in the former West Germany are consistant in suggesting that agricultural and non-agricultural factors are capitalized into farmland prices. The model for counties from the former East Germany (model 3) suggests that population and development land prices influence farmland prices, and does not support the hypothesis that agricultural factors are incorporated into the land value. After unification several questions arose about ownership of farmland in the former East Germany. Much of this land was in large estates (*gutshof*) prior to World War II. How former owners would be compensated and what their title claims were impacts land markets (reference?—Klaus, is this correect and is there an appropriate reference?). This uncertainty also could have been a factor influencing land prices. The results also could be a reflection of differences in the structure of agriculture in the former East Germany (non tradition of small farm ownership) or of national policies to stimulate diversified, industrial development in the former East Germany areas.

5.2. Agricultural Land Rents

A farmland rent model (Table 5) was estimated to test whether non-agricultural factors influence rents. Independent variable specification was the same in the farmland rent model as in the farmland price models above. The hypothesized relationships between the agricultural and non-agricultural variables and rent values were the same as in the price model. However, we expect the non-agricultural factors to have less of an impact on rent values because these factors influence the expected or potential returns to farmland owners rather than actually demand for conversion of agricultural land to non-agricultural activities. Agricultural productivity and demand factors are hypothesized to be capitalized into land rents. Non-agricultural factors that increase farmland owners' expected returns for land are tend to reduce farmland supply, and are hypothesized to increase rents.

Farmland rent data for counties in the former West Germany were obtained from the Ministry of Agriculture (1995). Data were only available for the 1991 production year. Ministry of Agriculture reports indicate that farmland rents have been stable through the 1990s (1995). Comparable data for counties in the former East German were not available.

Four of the 5 agriculture variables (EMZ, BARLEY, PIGS, and AGRIAREA) were statistically significant at the .05 level in the farmland rent model (Table 5). All 4 variables had the hypothesized signs. Two of the non-agricultural variables, POPDENSITY and MIGRATION, were significant at the .05 level. F-tests of the model find the result to be significant at the α 0,01 level. R^2 of the model is 0.615 and with that distinctively lower than R^2 in Model 2 (0.806).

6. Conclusion

Farmland price is influenced by factors related to the productivity of the land for agriculture as well as demand factors. Expectations about the potential value of farmland for non-agricultral activities, however, does not influence rents. Farmland rents in western Germany are mainly determined by agricultural factors, although population density and population growth also influence rents

The results of this analysis suggest that agricultural policy, as well as growth in the non-agricultural sector, influences farmland prices. Manure management regulation enacted in 1996 limits the indirect spreading of animal production branches, directly influence producers' expansion potential. Hog producers must show that liquid manure generated from their operations is disposed in accordance with regulations, placing an upper limit on the number of stock they can maintain and produce. As a producer reaches this upper limit, expansion of animal production is only possible if the producer obtains a contract to dispose of the liquid manure on other agricultural land or if the producer is able to purchase additional lank for his operation. Calculations for regions with a high livestock density (greater than 140 pigs per 100 hectare) indicate that the factor, PIGS, is the factor with the highest partial measure of certainty. (***Klaus, can hog farmers rent land or make agreements with farmland owners for waste disposal or do they need to own the land?***) Land productivity (EMZ and BARLEY) lost their meaning or were insignificant in these models. Government policy, in this case manure management regulations directly influences farmland prices and rents.

Results from the model for counties in former East Germany does not indicate a strong link between agriculture factors and prices. These results suggest the influence of the 1991 reunification of Germany still influences land prices. uncertainties about ownership still effect the value of agricultural land. The BVV (the land use and administration society mbh) is the deciding factor in selling land. In addition, many legal barriers still exist which make the selling of farmland more difficult and take longer.

This analysis suggests that agricultural productivity and farmland supply/demand factors influence farmland price and rents, similar to studies in North America. The results also suggest that the potential for development of land for non-agricultural activity creates a value expectation that is capitalized into farmland prices. This value, however, does not influence farmland rents.

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Statistische Landesaemter (diff. issues).

- Kreiszahlen - Ausgewählte Regionaldaten für Deutschland, different issues.
- Statistische Berichte, A-I, different issues.
- Statistische Berichte, B-I, different issues.

- Statistische Berichte, C-I, different issues.

- Statistische Berichte, C-III, different issues.

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- Statistische Berichte, M-I, different issues.

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Table 1: Price, number of sales, sales area and quality parameter of farmland sales in 1996

Characteristics	**Counties in Germany (total)**	**Counties in Western Germany**	**Counties in Eastern Germany**
Price (average) DM/ha.	26081	30952	7361
Min	2832	8529	2832
Max	87736	87736	20053
Standard deviation	17282	16053	3721
number of sales (average)[1]	127	32	137
Min	24	339	24
Max	472	126	472
Standard deviation	79.61	73.15	115.51
sales area. ha. (average)[1]	358	232	1195
Min	23.76	23.76	80
Max	4372	127.64	4372
Standard deviation	557.13	227.48	1125.19
quality parameter (average)	4522	4736	3760
Min	2800	280	2900
Max	7600	7600	4760
Standard deviation	1144.47	1169.62	493.05

[1] without Saxony (data were not available)

Klaus—can we add the stats for rent?

Table 2: Independent variables and expected signs

Independent variable	**Measuring**	**Expected sign**
Agricultural characteristics		
EMZ	quality measure (96)	+
BARLEY	dt per ha (95/96)	+
PIGS	pigs per 100 ha (94/96)	+
FARMS	total agricultural area divided by number of farms with more than 50 ha (96)	?
AGRIAREA	agricultural area in relation to total area	-
Non-agricultural characteristics		
AREA	total area in km^2	-
POPDENSITY	population density (96)	+
MIGRATION	net migration (94/95/96)	+
SITEPRICE	price for building sites in DM(95/96)	+
PERMITS	building permits (95/96)	-
SCHOOL	Gymnasiums per capita (96)	+
UNEMPLOYMENT	unemployment rate in per cent (94/96)	-
DUMMY	counties in western Germany	+

Table 3: Descriptive statistics of the independent variables

Variables	**Germany**		**Western Germany**		**Eastern Germany**	
	Mean	Std-V.	Mean	Std-V.	Mean	Std-V.
EMZ	4522.0	1144.5	4735.9	1169.6	3700.2	493.0
BARLEY	58.7	7.7	60.6	6.8	51.5	6.6
PIGS	135.0	173.9	159.1	187.3	42.8	33.1
FARMS	203.5	96.9	187.1	72.7	266.4	143.4
AGRIAREA	51.0	14.6	44.1	22.7	56.3	11.7
AREA	1169.7	544.2	1068.6	449.6	1558.1	691.0
POPDENSITY	178.6	153.1	196.1	163.1	111.6	77.1
MIGRATION	1552.8	1306.5	1548.9	1202.7	1568.2	1665.5
SITEPRICE	105.5	102.3	120.7	108.8	46.8	30.1
PERMITS	1033.5	519.0	1002.4	484.9	1153.2	626.0
SCHOOL	27594.3	16123.9	29358.3	16854.5	20816.8	10636.8
UNEMPLOYMENT	10.3	3.9	8.6	2.0	16.6	2.7

Table 4: OLS regression results for Farmland Price

Characteristics	**Germany**	**Western Germany**	**Eastern Germany**
	(model 1)	(model 2)	(model 3)
Constant	-14474.40**	-32291.03*	5298.59
	(-2.43)	(-3.76)	(0.66)
Agricultural variables			
EMZ	3.62*	3.03*	-1.06
	(5.58)	(4.36)	(-0.55)
BARLEY	207.16**	406.31*	-40.64
	(2.05)	(3.27)	(-0.28)
PIGS	30.96*	29.51*	26.65
	(7.98)	(7.10)	(1.26)
FARMS	30.75*	53.08*	16.40
	(4.70)	(5.01)	(1.97)
AGRIAREA	-5083	-38.49	-25.30
	(-1.04)	(-0.99)	(0.39)
Non-agricultural variables			
AREA	1.40	0.76	0.01
	(1.01)	(0.38)	(0.01)
POPDENSITY	43.43*	7.24*	33.01**
	(7.45)	(5.72)	(2.26)
MIGRATION	1.36**	1.94*	0.03
	(2.41)	(2.77)	(0.05)
SITEPRICE	47.16*	51.74*	64.20**
	(5.15)	(5.08)	(2.58)
PERMITS	-4.51*	-4.91**	-0.62
	(-2.98)	(-2.50)	(-0.42)
SCHOOL	0.09**	0.09**	0.05
	(2.43)	(2.29)	(0.66)
UNEMPLOYMENT	-985.20*	-540.59	-192.45
	(-4.99)	(-1.40)	(-0.66)

[a] Numbers in parentheses are t-ratios
[*] Significant at the 1 % level, ** Significant at the 5 % level

Table 5: OLS regression results for Farmland Rent

Characteristics	**Western Germany**	
	Coefficient	**t-ratios**
Constant	-505.540*	-3.948
Agricultural variables		
EMZ	0.061*	5.908
BARLEY	5.630*	3.032
PIGS	0.367*	5.925
FARMS	0.209	1.324
AGRIAREA	2.680*	4.640
Non-agricultural variables		
AREA	-0.022	-0.736
POPDENSITY	-0.222**	-2.057
MIGRATION	0.020**	1.986
SITEPRICE	0.106	0.699
PERMITS	-0.018	-0.642
SCHOOL	0.001	1.952
UNEMPLOYMENT	6.599	1.145

* Significant at the 1 % level, ** Significant at the 5 % level