

Full Length Research Paper

Land marketing and hedonic price model in Turkish markets: Case study of Karacabey district of Bursa province

Hasan Vural¹ and Halil Fidan^{2*}

¹University of Uludağ, Faculty of Agriculture, Department of Agricultural Economics, Bursa, Turkey.

²University of Ankara, Faculty of Agriculture, Department of Agricultural Economics, Ankara, Turkey.

Accepted 20 January, 2009

The aim of this study is to identify the variables affecting land value. Examined land was selected from farms in Karacabey district of Bursa province. Data was collected from 54 farmers by using survey methods and from second sources on farms. A hedonic price analysis was conducted to determine the marginal return to different land characteristics using an econometric model corrected for correlation. Parcel characteristics such as distance to farm, organic matter, potassium, saturated water, pH, phosphate, salinity, size of land were used in easement values. As expected, the characteristics did not completely explain the easement values in selling. In this analysis, seven factors affected well to land value were used. The problem definition was worked on the basis the analysis of the regulation reasons of price of land on the land markets. The land prices were determined by real sale factors. In the land areas, the agricultural price of land was municipality-specifically affected by factors such as the salinity, soil pH and the land use. The land purchases were coined noticeably less by speculation considerations. At the same time, one observes a shrinking commercial probability for plots, which lie in municipalities with high salty density in the last years. The reason for this could be the top price regulation for agricultural properties. The results of this research can help formulate sale decisions and nationalization.

Key words: Land market, price of land, hedonic price model, property rights.

INTRODUCTION

In Turkey, there are some important convenient agriculture areas. One of which is Karacabey plain. Farmers in the plain have grown various animal and vegetable products. While some farmers are growing only a product, most farmers do variety on production. Through the seven months of a year, climate conditions are appropriate for vegetal production.

Turkish arable land amounts to 27 million hectares (in 2006), about 30% of the total land area. The rest of the land is covered with forests, mountains, marshlands and lakes. Seventeen percent of the land in Bursa region is cover with plain. In Bursa, arable land occupies 40% of total culture area (429 599 ha) (Anonymous, 2005).

Land valuation is a complex operation (Bible and Hsieh, 1999). Accuracy in estimation of the value of land

may be compromised by a whole range of factors of methodological, technical and legal nature. The main problem faced by analysts is related to methodological objectivity, and the difficulties involved in selecting a comprehensive set of variables to reflect the value and heterogeneity of the plots to be valued.

Systematic analyses over the regulation reasons of the price formation on the agricultural land market are, however, hardly present in Turkey. In view of the high adjustment density within the range of the area planning and land politics, it is expressed by the participants on land market, interested with the land. This considerations are revealed on the agreed upon prices for determination of data of an agricultural plot in dependence of their characteristics to lead. Decision of market analysts is taken in to considerations for the land politics, strictly speaking, for the regional planning policy and agricultural policy. For example, if the height of the price of land is determined predominantly by agricultural factors, agrarian reforms

*Corresponding author. E-mail: fidan@agriankara.edu.tr.

lead to a change of the price parameters.

Agricultural product can show scientific results over the price formation on the agricultural market. We tried the regulation factors of the price of land to identify in three case examples. With the analysis of the agricultural land market of the Karacabey, the strong characteristic interested us, which from the proximity to the economical center of dense development are Bursa results. In illustration, development of the price of land is shown in connection with the land characteristics.

This, however, is one of the risks involved in using statistical or econometric modeling and has given rise to some criticism (Des Rosiers et al., 2000). Statistical and econometric methods are not causal; they simply measure the relationships that exist between variables previously selected by the analyst. Though statistics based on dependence models provide a quantitative tool to ensure the objectivity of results when the model is constructed, they do not generally simplify the task of selecting the causal or independent variables. In other words, the objectivity of the method is no guarantee against a biased choice of explanatory variables (Cavailhes and Wavresky, 2003).

The heterogeneity of farmland plots in Karacabey plain is such that over a distance of just a few kilometers, features such as soil composition, land relief, distance to farm centre or distance to road can vary widely. In more homogeneous areas, there are fewer factors determining the value of land. When this is the case, the construct is used to model the valuation needs to include a wide range of variables, but by doing so, the econometrician clashes headlong with whole purpose of modeling, which is to find simple, stable constructs to represent real situations and link land value to a known, limited and permanent set of price-determining factors (King and Sinden, 1994).

Methods were commonly used to implement this approach, which include the hedonic technique pioneered by Griliches (1971) and formalized by Rosen (1974). The relationship between land prices and affected well factors have been studied in the hedonic framework by Miranowski and Hammes (1984), Gardner and Barrows (1985), Ervin and Mill (1985), King and Sinden (1988) and Caswell and Zilberman (1986).

The analyses represent the work over the agricultural lands market. It comes in the end that predominantly agricultural factors affect the price of land formation.

The purpose of this study, therefore, is to offer a proposal for an econometric model to be used in valuing farmland. These plots provided the variables that will be described below. We investigate empirically how this selectivity problem affects the hedonic valuation of the effect of land value on agricultural land. The outcome of this empirical investigation is that hedonic valuation techniques might give rise to misleading conclusions about the effect of land value.

In this study, some factors, which affected land value,

were examined in Karacabey district. Land consolidation was done on twelve villages of Karacabey plain. After consolidation, irrigation cooperatives were founded and agricultural production was supported by government.

The structure of the paper is as follows; Land markets in Turkey, material and methods, results and conclusions

Land markets in Turkey

The market of urban land-use right in Turkey can be divided approximately into primary and secondary five markets based on different subjects and levels of market transaction. The model of land transaction includes grant, transfer, leasing, pooling and authorized operation etc.

1.) Primary urban land market, it is formed through grant of land-use right within certain periods from urban land-owner to urban land user. In Turkey, the urban land is owned by the private sector. The government is the supplier of urban land in primary market. At present, there are three key modes of transactions in urban primary land market: grant, leasing, pooling and authorized operation. Among them, grant is the most common one including processes by agreement, public bidding and auction. The leasing is also a common model of transaction. The pooling and authorized operation is the model usually implemented in land assets transaction of stock company.

2.) Secondary urban land market, it is formed through grant of land-use right in residual term of years by grantee holding the land-use right in primary urban land market to other land users who utilize the land according to specified terms and conditions after paying the grant charge. The land user can put this land-use right into market based on market rule. Accordingly, the market for land-use right transfer (namely secondary land market) has been established. The purpose and term of years specified in the grant contract cannot be violated while transferring the land-use right. Currently, there are four key transaction modes in this market: transfer, sub-leasing, mortgage and pooling.

The relationship between both markets (markets of land grant, transfer and leasing) is unified as well as equal transfer and competition. Owing to participation of the government, the land grant market plays a significant role in macro readjustment and control of the market, particularly in supply-demand relations of land market and land price equilibrium. The land transfer market is an important part and an energetic point of land markets. Its development gives direct presentation of sound land market, and plays an accelerative role in land grant market (Plantinga et al., 2002).

In this area, Important of Karacabey was increased from the pressure of agricultural growing for the price of land, additionally. On the basis of the available investigation, the first evaluation of the land characteristic is possible.

A comparison among the land which farmers one buys and which leaves flows on the hereditary way into the property, however, the probability of this goal to reach to land quality contains signs for the creation of right inequality, as only one group of prospective customers may buy agricultural plots. These statements lead to the following policies. They leave themselves in two main topics with different temporal realization possibility, summarize to urgent, and faster in measures convertible, a flexible organization of the lease land market and a stricter separation agricultural areas are in the agriculture zone. With it, a redefinition of the term "land purchase" is connected. The results of all case examples point out the fact that the market value of agricultural plots will approximate hardly for productive value. Over the land market, agriculture enterprises cannot secure themselves in the necessary areas at favorable prices, in order to be able to profit from the cost regression.

MATERIALS AND METHODS

The choice of the functional involution forms a relatively difficult task which can be used to represent results of the hedonic price model (Johnson and Wicherin, 1992). The methods used for decision (t-test) lead to the choice of a linear involution form. The examination of the coefficient of the parameters takes place in connection with the introduction of the SPSS. It is assumed that individual parameters exhibit different values with the different legal basic conditions. The model was estimated for 54 farms (Table 1). For this reason, the purchases of the land were not considered. All conditions for the computation of the involution model (size of land, salty, phosphate, pH, saturated water, potassium, organic matter, and distance to farm) are fulfilled in the selected linear model.

In this analysis eight factors that explained land value well were used. These factors are: land size, organic matter amount in soil, salt, phosphate, pH, saturated water, potassium and distance to the farm. Data such as pH, salt, potassium, and saturated water content were obtained from farm records. Farm records contain these data because farm soils have been analyzed due to land consolidation. The reason for the importance of soil as a determinant of the value of farmland is that it is this feature of the natural environment that has the greatest impact on its potential uses. It may, therefore, be considered to be the main factor when valuing land, particularly, because it is a technical and therefore objective parameter. On consolidation area, since the land characteristics are the main factors affecting the land value were used in study.

In this study, farm data such as land value, size of land, and distance to farm were obtained using survey method. Specifically land which sold really was selected. These farms' lands have been sold recent years. For this reason, sampling and analysis was done base on real selling price.

Land was classified into four different categories for organic matter criteria which coded as poor, medium, good and very good. When examining the effects of distance to farm criterion, metric distance scale (km) was used. Data were obtained through a survey of the district in question. Professionals specialized in land valuation were consulted in order to confirm these values, providing the variable expert value.

Land selling in the region is generally done by property owners. However, land is also partly marketed by real estate agents. In this case, real estate agent takes commission fee and the amount of the commission is established by bargaining method. On the other hand, real estates are generally marketed by real estate agents in urban areas, contrary to rural areas.

In this research, data of land which were sold recently were analyzed (Aakre et al., 1997). Therefore, with this purpose, data were obtained from farmer chamber, the union of irrigation cooperatives and county headship of agriculture ministry in this region.

It is to be accepted that a land-characteristics, different composition of the affecting attributes or their change, e.g. by economic changes, has a large influence on the price of land. Measured variables, which determine the price of land development on the basis of the capitalization theory over the time (growth of incomes), loose under the circumstances at force of expression, described above. A hedonic price model is suitable for the empirical analysis of the agricultural land market. The hedonic beginning represents an indirect method of the preference measurement. It is used in order to evaluate individual characteristics of a property, whose value consists of a bundle of characteristics (heterogeneous property). For heterogeneous goods a direct comparison of market prices is impossible, because these are comparable only with difficulty with one another (Shonkwiler and Reynolds, 1986). The theoretical development of the model is explained on work of Griliches (1971). Roses (1974) and Freeman and Myrick (1993) independently converted the theoretical bases of Griliches in models, which serve as basis for the estimation of the marginal values of goods characteristics.

Today, hedonic price models are not only used for the determination of the price of land and the landscape values, but also for the evaluation of many other heterogeneous goods as for example, the quality of consumer goods (Carew, 2000; Fidan, 2004), for the evaluation of (not-agricultural) real estates for the economic model, Subordinate the water quality (D'arge and Shogren, 1989). The hedonic beginning assumes that the prices are characterized by the function $P(Z_i)$. In the present work, the property characteristics are arranged into three components; the prices are, therefore, characterized by the following function: Equation 1: formula characteristics of an agriculture land. In other words: The market price of lands shows the value of its agricultural use. In the hypothesis test, it is examined whether the characteristic is significant for an additional unit of a characteristic other than 0. Hedonic method is used and missing prices are calculated by means of regression analysis. In equation 1 below, regression is shown as land price. Land price has been sold in the base period with a quality of Z . The quality Z is here meant as quality-vector, which include the values of several quality features.

$$P(Z_i) = P(Z_{\text{land(dä)}} Z_{\text{satty}} Z_{\text{phosp.}} Z_{\text{sat.water}} Z_{\text{pH}} Z_{\text{potass.}} Z_{\text{org.cmater}} Z_{\text{dist.tofarm}})$$

This is expressed in a significant t-value. In the investigation addressed here one is interested in many cases v.a. in the statement whether a characteristic has at all a significant influence.

RESULTS

Descriptive statistic (mean, standard deviation and the number data) on Table 1, regression analysis for the hedonic price model is also shown on Table 2.

Independent variable: Value of land the relationship among factors which affect land value has been given in Table 3. There is high positive correlation between organic matter and land size factors. Changing variables with changing value of land level:

In particular for distance to farm, it is stated that with increasing distance to farm, farm land value level increases (Pope et al., 1979), it has increased the price of land over on the average 6.577 with high increase rate of

Table 1. Result of descriptive statistics of factors.

Factors	Mean	Std. Deviation	N
Value of land (TL/da)	8.203	2.237	54
Size of land (da)	63.592	76.794	54
Salty (%)	60.180	10.320	54
Phosphate (kg/da)	7.262	0.293	54
pH	9.380	5.840	54
Saturated water (%)	59.180	24.260	54
Potassium (kg/da)	1.610	1.080	54
Organic matter (%)	0.070	0.500	54
Distance to farm (km)	2.090	2,060	54

Table 2. Regression analysis for hedonic model

Variables	Linear			Logarithmic		
	B	Std. Error	Sig.	B	Std. Error	Sig.
Constant	13.355	7.763	0.092	51.656	17.680	0.005
Size of land (da)	0.009	0.005	0.067	-6.313	2.843	0.031
Salt (%)	-0.067	0.039	0.090	-10.252	8.145	0.215
Phosphate (kg/da)	-0.603	1.115	0.591	0.416	0.566	0.466
pH	0.155	0.068	0.028	1.294	1.029	0.215
Saturated water	0.018	0.016	0.269	0.449	0.685	0.515
Potassium	0.216	0.309	0.488	-0.112	0.308	0.718
Organic matter	0.001	0.001	0.163	1.080	1.029	0.300
Distance to farm	6.577	11.183	0.559	0.005	0.005	0.282
R2	0.613		0.004	0.542		0.034

Table 3. Correlation matrix.

	Value of land	Size of land (da)	Salty (%)	Phosphorus	pH	Saturated water	Potassium	Organic matter	Distance to farm
Land value	1.00	-0.07	-0.21	0.31	0.24	0.36	0.11	0.15	0.14
Size of land(da)	-0.07	1.00	0.36	0.49	0.68	0.14	0.43	0.80	0.25
Salty (%)	-0.21	0.36	1.00	0.03	0.37	-0.13	0.06	0.21	0.10
Phosphate	0.31	0.49	0.03	1.00	0.59	0.64	0.49	0.65	0.09
pH	0.24	0.68	0.37	0.59	1.00	0.44	0.38	0.68	0.34
Saturated water	0.36	0.14	-0.13	0.64	0.44	1.00	0.29	0.29	-0.04
Potassium	0.11	0.43	0.06	0.49	0.38	0.29	1.00	0.40	0.45
Org. matter	0.15	0.80	0.21	0.65	0.68	0.29	0.40	1.00	0.13
Dist. to farm	0.14	0.25	0.10	0.09	0.34	-0.04	0.45	0.13	1.00

the distance to farm. The faster the distance to farm increases, the higher the prices for areas of arable land are paid. The main reason of this was consolidations according to farmers.

Hedonic model analysis was used to investigate relationships between land value and factors which effect land values (İşgin and Forster, 2006). Organic matter, pH, saturated water, potassium and distance to farm factors have positive coefficients, so they affect land value positively. Other factors did not affect land value. Gene-

rally, factors have small coefficients because land has similar soil characteristics and land values are not more different. It is seen that main factor which affect land value is distance to farm (İşgin and Forster, 2005).

In particular, one farm with a high phosphate density, with using highly fertilizer are increased the prices for agriculture land to be paid. The influence of the "distance to farm and phosphate" variables is statistically highly significant (56 and 59%, respectively).

Logarithmic model also used in the present work serve

hedonic price models primarily of the examination at the basis of the lying conditions of market equilibrium (Garett and Laird, 1995). If the land market with regularity was certain areas and the agricultural land market was not any longer in the equilibrium, in such a case, a basic condition of the hedonic beginning would be hurt. For the illustration of the model estimations for the LN of the pH, organic mater and saturated water point prognoses of the periodic commercial probability are accomplished. The variables concerned are varied gradually from their minimum to their maximum development. For all other variables the average values are used.

Logarithmic models support the basic assumption that the land value is being increased with LN of the pH, organic mater and saturated water. If the connection between distance to farm, salt and farm size were other one, one would have had to reject the hedonic beginning.

Conclusion

Land purchasers who arose actively up to the introduction of the rural and urban areas on the land market were not ready to pay high prices for agriculture areas in municipalities with a very strong increase of the pH, organic mater, phosphate, and distance to farm. In agricultural land markets, the signs of purchases on speculation abated and the average prices almost halved themselves. Nevertheless, the prices for agricultural plots are affected further by the same land factors.

A sufficient surface mobility is to be secured over a flexible lease in land market. The productive value regulation (assumption of a land purchase to the productive value) will remain necessary. Definition of the term "land purchase", thus it is to be ensured our judgment that the assumption of agriculture areas and agricultural infrastructure is granted predominantly to full-time farmers. It is not a goal of the land policies to create favorable living conditions for people active in the agriculture. Significantly higher price of land in municipalities with a high pH, distance to farm, phosphate, and organic matter shows that straight such advantages in the price of land has. It is a strict separation among agriculture areas which is not agriculturally used any longer or for except-agricultural purposes to be used to be able to aim. The results of the empirical investigations confirm such expectations. Regression shows that the top price regulation belongs to the market forces and land characteristics. This expresses itself in a very weak commercial activity for plots with high agricultural land potentials.

REFERENCES

- Aakre DG, David M, Saxowsky M, Vreugdenhil HG (1997). North Dakota land valuation model, *Agric Econ. AE 97001*
- Anonymous (2005). The report of Agric Headship of Agr. Ministry in Bursa city. www.bursatarim.gov.tr
- Bible DS, Hsieh C (1999). Determinants of vacant land values and implications for appraisers. *Appraisal J. 67(3): 264-269.*
- Carew R (2000). A hedonic analysis of apple prices and product quality characteristics in British Columbia. *Canadian J. Agric. Econ. 48: 241-57.*
- Caswell M F, Zilberman D (1986). The effects of well depth and land quality on the choice of irrigation technology. *Am. J. Agric. Econ. 68: 798-811.*
- Cavailles J, Wavresky P (2003). Urban influences on periurban farmland prices, *Eur. Rev. Agric. Econ. 30 (3): 333-357.*
- D'Arge RC, Shogren J (1989). Okoboji experiment: comparing non-market valuation techniques in an unusually well-defined market for water quality. *Ecol. Econ. 1(1): 251-259.*
- Des Rosiers FM, Theriault P, Villeneuve Y, (2000). Sorting out access and Neighborhood factors in hedonic price modeling, *J. Prop. Invest. Finan. 18 (3): 291-315.*
- Ervin DE, Mill J W (1985) Agricultural land markets and soil erosion: policy relevance and conceptual issues. *Am.J. Agric Econ. 67: 938-942.*
- Fidan H (2004). Quality Level And Price In Turkish Durum Wheat Market, *Quality & Quantity International J. Methodol. Kluwer Acad. Pub. 38: 319-329.*
- Freeman A, Myrick III (1993) .The measurement of environmental and resource values: theory and methods, *Resources for the Future.*,
- Garett M, Laird F (1995). Regression models for bivariate discrete and continuous Outcome with clustering. *J. Am. Stat. Assoc. (JASS); 845.*
- Gardner K, Barrows F (1985). The impact of soil conservation investment on land prices. *Am. J. Agric. Econ. 67: 943-947.*
- Griliches Z (1971). *Price Indices and Quality Change.* Cambridge, Mass.: Harvard University Press.
- İşgin T, Lynn Forster F (2005). Using real options theory to analyze the impacts of urban development on farm real estate markets, *Turkish J. Agric. For. 29: 409-417.*
- İşgin TF, Forster L (2006). A hedonic price analysis of farmland option premiums under urban fluencies, *Canadian J. Agric. Econ. 54: 327-340.*
- Johnson RA, Wicherin DW (1992). *Applied Multivariate Statistical Analysis.* 3rd edition. Prentice Hall Inc. Englewood Cliffs. N.J. 07632. London.UK.
- King DA, Sinden JA (1988). Influence of soil conservation on farm land values. *Land Econ. 64: 242-255.*
- King DA, Sinden JA (1994). Price formation in farmland markets, *Land Econ. 70 (1): 38-52.*
- Miranowski JA, Hammes DB (1984). Implicit prices of soil characteristics for farmland of Iowa. *Am J. Agric. Econ. 66: 645-649.*
- Plantinga A.J, Lubowski .R.N, Stavins R.N (2002). The effects of potential land development on agricultural land prices, *J. Urban Econ. 52: 561-581.*
- Pope RP, Kramer RA, Green RD, Gardner BD (1979). An evaluation of econometric models of U.S. farmland prices, *Western J. Agric. Econ. 4: 107-119.*
- Rosen S (1974). Hedonic Prices And Implicit Markets - Product Differentiation In Pure Competition *J. Poli. Econ. 82: 34*
- Shonkwiler JS, Reynolds JE (1986). A note on the use of hedonic price models in the analysis of land prices at the urban fringe, *Land Econ. 62(1): 58-63.*