THE ROLE OF EXPECTATIONS IN THE DETERMINATION OF VACANT RURAL LAND PRICES AT THE URBAN FRINGE

by

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Introduction

In recent decades there have been many cross-sectional studies of the determinants of the variation in rural land prices. Various site characteristics related to productivity, parcel acreage, and location have been incorporated in most of these studies (Craig and Mapp; Schuh and Scharlach; Hammill; Hushak and Sadr; Vandeveer and Kletke). The impact of governmental programs (Harris and Nehring; Hushak), general price inflation (Locken, et al.; Abdel-Badie and Parcher), and urbanization factors (Barrows and Dunford; Ruttan) have also been examined in many studies. A few land price analyses have incorporated some socioeconomic characteristics of land market participants in an effort to quantify the potential impact of income, age, occupation, and intended use of the parcel (Locken, et al.; Blase and Hesemann; Schmid).

Although it is well known that the present value of rural land is dependent upon anticipated future net returns appropriately discounted, very few researchers have incorporated expectations into their analyses of land price variations. Harris and Nehring included a variable in their study representing prospects for improved farm income in the long run based upon past trends. However, Harris and Nehring's objective was to develop a theoretical model of maximum bid price for farmland, not to analyze variations in farmland prices. No econometric studies of farmland prices have incorporated the expectations of land market participants with respect to inflation, development/growth prospects, governmental policies, or other factors which could potentially affect future net returns.

In the following section of this paper, a conceptual model of the land market is presented in which the role of expectations is explicitly

acknowledged. The cross-sectional data and variables used to test this conceptual model are then discussed. In the third section of this paper, the empirical results are examined for each of the major components of the conceptual model, including expectations. The conclusions which can be drawn from this study are discussed in the final section of the paper.

Conceptual Model

Rural land is a relatively unique commodity. Each parcel of rural land occupies a unique location. Furthermore, each parcel tends to have different site characteristics, e.g., soil conditions, topography, environmental amenities, and size. Rural land is also a durable commodity which can potentially be used to produce a wide variety of goods and services over time, including food and fiber crops, housing services, recreational services, and transportational services. Since land is a durable good, its present value is highly dependent upon future economic returns which are uncertain. Furthermore, current and future uses of rural land are subject to regulatory policies (such as zoning), ad valorem taxation, and other governmental programs (such as conservation programs).

In summary, there are many factors involved in the actual determination of rural land prices. These factors can be divided into five categories: external forces, land characteristics, seller characteristics, buyer characteristics, and expectations. The external forces are those economic, governmental, and urbanization/growth influences which affect the current use of the parcel but are not related to parcel characteristics. For example, the rate of general price inflation, farm commodity price support programs, and urban sprawl may affect the net returns received from a particular parcel of farmland near a large city.

The second set of factors affecting rural land prices are the characteristics of the land itself. These characteristics include the physical attributes of the site (soils, topography, climatic conditions, etc.), locational/accessibility factors, and environmental amenities. The characteristics of the seller are another potentially important set of factors influencing land values. For example, an elderly farmer may have a different reservation price than a (nonfarm) speculator selling an identical parcel. Similarly, the bid prices of various potential buyers may be affected by their age, education, income, and intended use of the parcel.

Expectations are the fifth set of factors which potentially influence the market price of rural land. As noted previously, land values are highly dependent upon future economic returns. Thus, expectations regarding future rates of inflation, mortgage interest rates, crop prices, price support programs, zoning, highway placements, population growth, and other external forces will play a crucial role in the determination of land values.

In forming their reservation price, a seller will consider current external forces, the characteristics of the parcel, their particular personal situation, and their expectations regarding future external forces. Similarly, potential buyers will determine their bid prices on the basis of their evaluation of current external forces, land characteristics, their personal situation with respect to income, intended use, etc., and their expectations regarding future economic, governmental, and urbanizational/growth conditions. A land transaction occurs when at least one potential buyer's bid price exceeds the current landowner's reservation price. The seller will presumably accept the highest bid price over his/her reservation price. Consequently, one can focus on

the factors influencing the successful buyer's bid price when analyzing the determinants of the variation in rural land prices on parcels actually exchanged during a given time period. Thus, seller characteristics are excluded from the model presented in this paper.

Data

To test this conceptual model, data were obtained on transactions involving vacant rural land parcels of at least five acres in size. These transactions occurred in 1978 in Clark County, Washington. Clark County is in the southwestern corner of the state, across the Columbia River from Portland, Oregon. The city of Vancouver in the southwestern corner of the county contains about 50,000 people, which constitutes over two-thirds of the county's population. During the decade of the 1970's, Clark County experienced a 49.6% population increase. Most of this growth has occurred in the unincorporated parts of the county in a "buckshot" pattern.

The rural land transactions data were obtained in two ways.[1] First, a questionnaire was mailed to people who purchased vacant land in the county within 20 miles of the Vancouver central business district during 1978. This survey provided information on some land characteristics, socioeconomic characteristics of the buyers, and their expectations. For each returned questionnaire, site and accessibility data were then collected. The explanatory variables that are used in this study are described in Table 1. Note that three expectation variables (RCHANGE, INFLATE, and INTENSE) are included as explanatory variables. In total, data on all of the variables were obtained on 83 parcels.

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[1] For a complete description of the data acquisition methods, see Barnard (pp. 70-6).

TABLE 1. Description of Explanatory Variables Used in Multiple Regression Model

External Forces	
DATE	The month of purchase (1 = January; 2 = February, etc.) during calendar year 1978.
INOROUT	Dummy variable which is 1 if the parcel was located inside the Urban Sewer Service area in the county, and 0 otherwise.
HOMES	Buyer's estimate of the number of homes within one-quarter mile of the parcel at the time of purchase, grouped into five categories (1 = 0 homes, 2 = 1-5 homes, etc.)
PRESNEIB	Buyer's description of the neighborhood surrounding the parcel (1 = entirely agricultural; 2 = mostly agricultural; 3 = mix of agricultural and residential, etc.)
Land Characteristics	
SOIL	Probability that a parcel would receive approval for septic tank installation, as determined by an SCS soil scientist (1 = 10% chance, 2 = 20% chance, etc.)
ROADDUM	Dummy variable which is 1 if the parcel has some road frontage, and 0 otherwise.
ACRESINV	Inverse of parcel acreage
LAKEDUM	Dummy variable which is 1 if a lake, pond, stream, or river exists on or borders the parcel, and 0 otherwise.
CBD	Distance in straight-line miles from the parcel to the Vancouver central business district.
FREEWAY	Distance in straight-line miles from the parcel to the nearest interstate highway ramp.
TOWN	Distance in straight-line miles from the parcel to the nearest of three small towns near Vancouver.
VIEWDUM	Dummy variable which is 1 if the buyer thought the view from the parcel enhanced its value as a homesite, and 0 otherwise.
PARKS	Distance in straight-line miles from the parcel to the nearest county park.
Buyer Characteristics	
CATDUM	Dummy variable which is 1 if the buyer was part of a partnership (other than husband-wife) or corporation, and 0 otherwise.
AGE	Age of the buyer in years.
EDUC	Education of the buyer grouped into four categories (1 = did not complete high school, 2 = high school graduate, etc.).

TABLE 1. Continued

INCOME	Approximate net family income before taxes in 1977 grouped into eight categories (1 = less than $5,000, 2 = $5,000-$9,999, etc.)
USE1	Dummy variable which is 1 if the buyer acquired the parcel strictly for agricultural uses, and 0 otherwise.
USE2	Dummy variable which is 1 if the buyer acquired the parcel for a mix of agricultural and residential uses, and 0 otherwise.
USE3	Dummy variable which is 1 if the buyer acquired the parcel strictly for residential uses, and 0 otherwise.
USE4	Dummy variable which is 1 if the buyer acquired the parcel for neither agricultural or residential uses, and 0 otherwise.
PARCELS	Approximate number of parcels the buyer bought or sold in the past five years, grouped into four categories (1 = none, 2 = one other parcel, etc.)
Expectations	
RCHANGE	Buyer's opinion concerning the change in the value of his/her parcel relative to general land values in the county over the coming year, grouped into five categories (1 = this parcel's value will increase much more rapidly, 2 = this parcel's value will increase more rapidly, etc.)
INFLATE	Buyer's opinion concerning the average annual general inflation rate over the next five years, grouped into four categories (1 = 1-3%, 2 = 4-7%, etc.).
INTENSE	Dummy variable which is 1 if the buyer feels that the neighborhood surrounding his/her parcel will be more intensively developed in the next five years, and 0 otherwise.

Empirical Results

The relationship between the explanatory variables (Table 1) and dependent variable, price per acre, was analyzed using an OLS model. The results of this analysis are shown in Table 2. Considering that cross-sectional, primary data are involved, the regression results are quite good. The R^2 is .720 and the aggregate F-value is 6.20, which is significant at the .01 level.

External Forces

Among the variables measuring external forces, two variables have a significant influence on the variation in price per acre. DATE has a positive coefficient which is significant at the 1% level. This coefficient indicates that land prices per acre increased from month to month throughout the year, other things being equal. This presumably captures the influence of general price inflation on land prices. The other significant coefficient involved PRESNEIB. Since the value of PRESNEIB increased as the surrounding land uses became more intense, the positive coefficient indicates that higher prices per acre are associated with increasing intensities of the surrounding land uses, ceteris paribus. In other words, a commercial area generally has higher land values than an agricultural area, other things being equal.

Land Characteristics

Several of the land characteristics variables had a very important impact on land price variations. For example, SOIL had a highly significant, positive coefficient. This indicates that buyers paid higher prices per acre for parcels with a higher probability of septic tank approval, other things being equal. This is quite reasonable from several standpoints. First, much of the soil in Clark County is unsuited for septic

TABLE 2. Multiple Regression Model of the Determinants of the Variation in Rural Land Prices per Acre (n = 83, mean price per acre = $4471.11)

	Coefficients	Standard Error
Intercept	-18,592.79***	6,114.14
External Forces		
DATE	376.52***	131.69
INOROUT	-1,642.62	2,726.17
HOMES	-658.49	569.08
PRESNEIB	2,743.20***	400.91
Land Characteristics		
SOIL	516.63***	164.14
ROADDUM	1,550.24*	805.01
ACRESINV	20,676.05***	6,920.15
LAKEDUM	1,517.25*	788.59
CBD	538.45[a]	335.23
FREEWAY	-486.86*	279.02
TOWN	219.10	250.32
VIEWDUM	-1,507.20*	893.05
PARKS	-294.22	295.87
Buyer Characteristics		
CATDUM	90.32	1,176.81
AGE	32.24	38.50
EDUC	725.82*	432.02
INCOME	-69.54	274.57
USE1		
USE2	487.64	1,280.75
USE3	-675.96	1,756.34
USE4	-442.78	1,501.10
PARCELS	-240.17	432.24
Expectations		
RCHANGE	255.37	520.77
INFLATE	828.09[a]	541.65
INTENSE	2,222.80**	996.97
R^2 = .720	F-Value = 6.20***	

***Significant at .01 level
**Significant at .05 level
*Significant at .10 level

[a]Significant at .15 level

tank drainage fields. Furthermore, sewers are only available within the Urban Sewer Services Area (USSA). Thus, the probability of getting septic tank approval is an important consideration for parcels outside the USSA which are purchased for development. For those buyers not planning to develop their rural land, SOIL may serve as a proxy for general soil quality. Consequently, soils which are receptive to septic tanks may also have qualities which are conducive to extensive land uses like agricultural production.

Both ROADDUM and LAKEDUM had positive coefficients which were significant at the .10 level. This indicates that road frontage and the presence of water are associated with higher vacant land prices per acre, ceteris paribus. Hence, buyers pay a premium for the accessibility and amenities which these variables represent, respectively. Similarly, ACRESINV has a highly significant, positive coefficient which captures the strongly negative, nonlinear relationship between price per acre and parcel acreage. Thus, price per acre decreases at a decreasing rate as parcel acreage increases.

Two of the three distance variables reflecting accessibility have significant coefficients. FREEWAY has a negative coefficient which is significant at the 10% level, indicating that price per acre declines with increasing distance from the interstate highway, other things being equal. This negative relationship corresponds with the expected impact of distance, which was first hypothesized by Von Thunen. However, the positive coefficient on CBD (significant at the .15 level) appears to violate Von Thunen's theory. Given the particular situation in Clark County, this influence of distance from the Vancouver central business district is not very surprising. The rapid nonmetropolitan growth in the unincorporated parts of the county coupled with an actual decline

in population in the city of Vancouver portend a significant decline in the importance of the central business district. The positive coefficient on CBD may actually reflect a premium associated with "country living." In summary, the regression results indicate that an increasing distance from the freeway, not the CBD, has a negative impact on rural land prices per acre.

VIEWDUM is the last of the land characteristics variables to have a significant coefficient. However, its negative sign was not anticipated. A negative coefficient indicates that lower land prices are associated with parcels having a view which would enhance their value as a homesite, ceteris paribus. Apparently, this variable is serving as a proxy for some other influence on rural land prices. The parcels with the best views generally are found in the northern and eastern parts of the study area. These areas also tend to be more agriculturally oriented. Consequently, the relatively low value of farmland compared to residential or commercial land may have been partially reflected in the VIEWDUM variable.

Buyer Characteristics

Generally, the variables representing the socioeconomic characteristics of the buyers and their intended use of their parcel are not significant determinants of the variation in land prices per acre, given the other explanatory variables in the model. Among the socioeconomic variables, only EDUC had a significant (positive) coefficient. This indicates that the more highly educated buyers tended to pay higher prices for their parcels, ceteris paribus. As in the case of VIEWDUM, EDUC may be serving as a proxy for some other factor. For example, people who purchase rural land for corporations and non-family partnerships may be more educated

than the average land buyer. To the extent that these land uses are associated with higher land prices, EDUC would have a positive coefficient.

Although intended use might be expected to significantly affect rural land values, none of these variables had a significant coefficient in the regression model. There are two potential explanations for this lack of significance. First, as has been discussed above, other variables in the regression (like VIEWDUM and EDUC) may be serving as proxies for intended use. Secondly, intended use may not be an important determinant of variations in land prices, given the land characteristics, external forces, and expectations. For example, a farmer will probably not buy land for agricultural uses in a predominantly residential/commercial area. Similarly, a person wanting land as a homesite will not purchase a parcel outside the USSA with a low probability of septic tank approval. Consequently, intended use may be "locked in" by the other explanatory variables.

Expectations

Two of the three expectations variables had significant coefficients. INTENSE had a positive coefficient which was significant at the .10 level, indicating that buyers who expected the neighborhood surrounding their parcel to become more intensively developed in the next five years paid higher prices per acre than other buyers, ceteris paribus. Similarly, buyers anticipating higher general inflation rates paid higher prices per acre than buyers expecting lower inflation rates, irrespective of land characteristics, external forces, and opinions about future development trends in the neighborhood. Since expected development in the neighborhood and higher inflation expectations would imply an increase

in future net returns, the coefficients on INTENSE and INFLATE should be positive.

Conclusions

Several conclusions can be drawn from the regression model discussed in this paper. First, land characteristics were shown to be a very significant determinant of variations in vacant rural land prices per acre. In particular, site characteristics (such as acreage and septic tank suitability) and proximity to the transportation corridors were found to be important. Second, external forces related to economic factors (like inflation) and neighborhood urbanization/growth characteristics were also shown to have a significant effect on rural land prices. Finally, buyer expectations were shown to be important in explaining the variations in rural land prices. Specifically, expectations with respect to future development in the neighborhood and future rates of inflation were significant factors in the regression model.

One caveat must be noted. Clark County is growing quite rapidly, and this growth is being encouraged by the local governments. Much of the county's growth is occurring in the unincorporated areas where relatively small residential lots are permitted. Consequently, there are many "speculators" in the land market. In an area with fewer "speculators" and less demand for building sites, expectations may not be quite as important as they are in Clark County. Nevertheless, expectations should be a significant determinant of price variations in any rural land market via their impact on anticipated future net returns.

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