
Community

Abstract. This article uses hedonic modeling for valuation of real estate located near Jackson, Wyoming and agricultural property throughout the remainder of Wyoming. The attributes of the hedonic model used to value resort properties are compared with attributes of the model used to value agricultural properties. It is observed that attributes affecting the value of resort property are significantly different from attributes affecting the value of agricultural property. Resort properties, even though classified as agricultural, derive their values from scenic amenities, existence of streams, vegetation and relative location. Alternatively, agricultural lands throughout the remainder of Wyoming derive value from a combination of productive and nonproductive attributes.

Introduction

It is commonly observed that properties surrounding resort communities are at least temporarily being used and taxed for purposes other than their highest and best use. Regardless of current use, valuation of properties located in or near resort communities must be based on their highest and best use—generally for future development. The difficulty in estimating the market value of this unique type of property is in selecting the appropriate and most reliable valuation methodology. This article develops a hedonic model for valuing real estate property located in Jackson Hole, Wyoming and compares this hedonic model with another hedonic model for valuing agricultural property located in the rest of Wyoming. The authors have previously used hedonic models to estimate real estate values in a number of court cases, and for assessing real estate values for property taxes.

We examine the attributes that are important in the valuation of land literally surrounding the Jackson Hole ski area located near Jackson, Wyoming, adjacent to the Grand Teton National Park and south of the southern entrance to Yellowstone National Park. In recent years, this location, in addition to developing a national reputation, has also attracted international interest as a resort community, and has experienced double-digit appreciation in values.

Much of the undeveloped land in the Jackson Hole Valley is currently being used for ranching or, at least, is designated as ranching operations for property tax purposes.

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However, by far the largest cash flow component resulting from these operations is the property tax savings resulting from the agricultural designation where relatively very little cash flow is generated by ranching. Thus, running a few head of cattle on a parcel of real estate and the consequential designation of the land as agricultural property for tax purposes may actually add to its valuation. The market value of this type of real estate is many times its agricultural assessed value since its highest and best use is for single family and/or resort development. For agricultural lands held only for farming or ranching, we have no major concern with taxing the property based on production; however, to support non-productive uses of this land with property tax subsidies is another issue. Not surprisingly, it is found that properties located near resorts have very few attributes in common with agricultural land.

Development in the Jackson area is limited in some instances due to access, as well as current development restrictions. However, according to current policy, there are no development restrictions for home sites containing at least thirty-five acres. Subdivisions with lots smaller than thirty-five acres are being strictly limited and regulated. The sale of the Crescent H Ranch, a 1300-acre parcel for \$53 million, represents a recent transaction that takes advantage of the thirty-five-acre exemption. This property was subsequently subdivided into thirty-five to forty acre lots with sale prices of approximately \$5 million each.

As a result of the Crescent H sale and the subsequent subdivision, the Jackson Hole Valley market may have undergone a structural shift. To test for a structural shift, we formulate a hedonic model containing a zero-one dummy variable. The model, where the dummy variable is set to zero, assumes that the Crescent H 1300 acre and the later subdivided sales had not occurred. Subsequently, when the dummy variable is set to one to identify Crescent H sales, the impact on real estate values includes both the original Crescent H sale and the subsequent division into thirty-five to forty acre lots. Our results suggest that the Crescent H sale and subsequent subdivision, indicate a structural shift in real estate prices, that may be attributed to the expansion of this market to international investors. These sales may or may represent an anomaly.

Hedonic Modeling

This study describes a process for valuing Jackson Hole property and agricultural property located throughout the remainder of the state using multiple regression analysis (MRA) and hedonic equations to estimate the market price per acre of deeded property.¹ MRA will control for heterogeneous characteristics that may represent both productive and non-productive characteristics.

We find that non-productive factors such as location, scenic view, location relative to the Snake River, the presence of streams and vegetation dominate the significant factors that determine market valuation of rural properties located in the Jackson Hole Valley. Agriculture productivity factors are generally insignificant because of high land values. Thus, location and scenic and/or recreational attributes of properties located in or near Jackson Hole contribute most toward market price.

Significantly different factors are found to be important for estimating the price per acre for agricultural properties located throughout the remainder of the State of Wyoming. Significant attributes include improvements to real property, scenic and recreational value, the ecoregion in which the property is located, the number of deeded acres, availability of public and private grazing leases, and the animal unit months of agricultural production.²

The rationale for using the hedonic approach is that complex commodities, such as a parcel of real estate, can be thought of as a bundle of separate measurable components or attributes. Through the use of hedonic models it is also possible to control for the time of sale and, therefore, include sales that span several years. Further, MRA is a recognized appraisal method that is often used in mass appraisal.³ The authors have used MRA for valuing individual real estate parcels for expert witness testimony and for property tax assessments, but its use by appraisers has been limited since they often lack sufficient comparable sales data or expertise to apply this approach. Thus, its lack of use is not generally due to any limitation of the MRA approach.

Real Estate Sales Data

Two different data sets are used. The first represents vacant land parcels sold in the Jackson Hole Valley. The second set of data represents sales of ranch properties located in the other twenty-two counties in Wyoming.

Jackson Hole Data

We obtained 115 sales of vacant land parcels⁴ that took place from the early 1980s through August 1997.⁵ These sales are located in the following Multiple Listing Areas:

- 3—West of Snake River and north of Wilson.
- 4—West of Snake River and south of Wilson.
- 5—Skyline Ranch, north of Highway 22 to Sagebrush Drive and west of Spring Gulch.
- 6—North of Jackson and south of Gros Ventre Junction.
- 7—North of Gros Ventre Junction and Kelly and Moran.
- 9—South of Jackson to Snake River Bridge.
- 10—South of Snake River bridge to County Line.

To match the time period for both data sets, our data was limited to arms length sales that occurred between January 1989 and August 1997 that took place in each of the above areas. The resulting 105 sales were further divided into smaller geographic areas by again dividing areas 3, 4, 5, 6 and 9 each into two parts. The remaining two areas, 7 and 10, were left as defined.

The final data set of 105 parcels ranged in size from 32.2 to 1300 acres, with an average of 117.9 acres. Without adjusting for price appreciation over the entire eight-year period, the price per acre ranged from \$2,093.60 to \$140,000, with an average of \$22,462.90.

We show in our analysis of the Jackson Hole data that even with limited sales data, wide fluctuation in the sale price per acre, and diverse characteristics, a well-fitting hedonic model may be developed and used for predictive purposes. These results demonstrate the power of regression analysis and its flexibility in valuing property, even within a resort community.

State of Wyoming Data

The second data set used for this study consists of 896 agricultural land sales from twenty-two of the twenty-three counties in the State of Wyoming. Sales from Teton County, which includes the Jackson Hole Valley, are excluded from the data set.⁶ Farm and ranch sales in this data set occurred during the period of January 1989 to August 1997, which matches the time period for the Jackson Hole sales data.

For this study, agricultural land sales with less than 100 deeded acres are omitted from the data set, because, for all practical circumstances, properties with less than 100 deeded acres are not purchased in Wyoming for agriculture production. Also, agricultural lands with deeded property and/or grazing permits in states other than Wyoming are eliminated from the data set. Non-arms-length sales and sales with incomplete data were also deleted. The final data set of 896 agricultural sales had an average sale price of \$458,173.56, represented on average of 4026.9 acres of deeded land and 2124.7 deeded animal unit months, AUMs. The average price per acre was \$344.06.

The Hedonic Models

The dependent variable used for each data set is the price per acre. For the Jackson Hole model, possible explanatory variables include the date of sale, a dummy variable for each of the Jackson Hole Valley geographic areas in which the sale property is located, the number of acres included in the sale property and a set of dummy variables representing the scenic qualities of the sale property, including the view of Grand Teton Peak. Also included is a set of dummy variables accounting for the property's access to live streams or creeks, as well as Snake River frontage. Sets of dummy variables addressing issues such as access, topographical features, forms of vegetation and development were also considered. Individual sets of dummy variables were tried in the model and included or removed based on the results of an incremental *F*-test.

For statewide agricultural sales data, explanatory variables were selected to incorporate and control for the income producing ability of the agricultural operation, location differences and changes in market conditions. Results from previous studies and the availability of data also influenced the selection of explanatory variables.⁷

For both sets of data, the date of sale variable, as it is incorporated in the models, controls for the fact that market prices may not have been stable throughout the time period of this study.⁸ The form used for the date of sale variable was suggested by

Bryan and Colwell (1982) and has been applied by Sunderman and Spahr (1994), Spahr and Sunderman (1995, 1998) and Colwell, Munneke and Trefzger (1998). In this method, each date of sale is defined as a linear combination of the end points of the year in which the sale occurs. Date of sale variables, $B(y)$, are the proportionate weights. There is a date of sale variable for each year in which sales occurred. For example, suppose a sale occurred in September 1990, then B_{90} is 0.25, B_{91} is 0.75 and all other $B(y)$ variables are zero. Since the sale was closer to the beginning of 1991 than to the beginning of 1990, B_{91} is larger and given more weight than B_{90} . This approach allows the rate of change in prices to be different for each year and allows for a price continuum rather than a step function. Since our desire was not to build a price index, but rather to control for market changes, this approach was chosen.⁹

Although all property in the Jackson Hole area possesses a high degree of scenic and recreational value, some properties possess more than others, thus four scenic dummy variables (*FAIR*, *AVERAGE*, *GOOD* and *EXCELLENT*) were formed. Properties that have an excellent view of Grand Teton Peak and generally excellent scenic qualities were given a one for the "excellent" dummy variable. Alternatively, those properties that had no view of the Tetons and possess less than average scenic qualities were given a one for the "fair" dummy variable. For those properties lying between the other properties in scenic value, the dummy variable "average" or "good" was given a value of one.

In the Wyoming agricultural property data, many sale prices include permanent improvements such as buildings, irrigation equipment, corrals, etc. These improvements may be essential to the agricultural operation. When improvements were included, the agriculture property appraiser estimated the contribution to the sale price represented by these improvements. Rather than deducting the appraiser's value of real property improvements from the sale price and using this adjusted price as the dependent variable, we include the value of real property improvements per deeded acre (*REAL/ACRES*) as an explanatory variable. By doing so, it was possible to statistically control for these improvements and determine how these improvements affect the sale price of the farm or ranch. A coefficient of one for the improvement variable would indicate that appraiser's estimates of improvements equals the value buyers place on the future stream of net benefits resulting from the existing improvement. A coefficient that is greater than one would indicate that agricultural property appraisers underestimate the value of real improvements.

Similar to Jackson Hole sales, a major factor influencing the sale prices of agricultural property in Wyoming is scenic and/or recreational value. A subjective assessment of this factor is accomplished using four dummy variables (*FAIR*, *AVERAGE*, *GOOD* and *EXCELLENT*).¹⁰ If a farm or ranch contains very scenic and/or high recreational value, the dummy variable "excellent" is given a value of one. Alternatively, if a property possesses very little scenic and/or recreational value, the dummy variable "fair" is given a value of one. The other variables, "average" or "good," represent an increasing continuum of scenic and/or recreational value.

Public grazing leases represent an important component of agricultural properties in Wyoming, as well as most western states.¹¹ Public grazing in Wyoming consists of section 3 BLM (Bureau of Land Management) land (*BLM3AUM*), Section 15 BLM land (*BLM15AUM*), State of Wyoming leases (*STATEAUM*), U.S. Forest Service leases (*FORSTAUM*) and private leases (*PRVTAUM*). Each of these variables represents an estimate of the number of animal unit months of grazing allowed or available on the lease. Section 3 BLM leases generally consist of larger acreage or tracts of land that may represent an interest in a grazing association or at least represent a larger scale. Section 15 BLM leases generally consist of those tracts that are interspersed among a farm or ranches' deeded acres. Frequently, Section 15 tracts were lands that were never homesteaded or purchased from the federal government. These tracts usually have the least desirable terrain and usually contain little water. Thus, it is hypothesized that these two types of BLM leases will represent leases with lower levels of intrinsic desirability when compared to other types of leases.

A USDA/USDI (1993) study, that included the State of Wyoming as one of the three test states, classified regionalized forage values into clustered intrastate allotments based on twenty-one different ecoregions. Six of these ecoregions are found in the counties studied in Wyoming. The ecoregions represent a composite set of ecological boundaries identified by differences in soil, vegetation, land form, climate and use. The dummy variable that identifies whether a farm or ranch is located in Ecoregions 3, 4, 5, 7, 8 or 9 is included to control for location.

To control for the expected nonlinear relationship between number of acres and the price per acre, the logged version of acres (*LDACRES*) was used in both sets of data. In the Wyoming data, *QUALITY*, is the ratio of deeded AUMs to deeded acres. This ratio controls for the difference in quality of ranch land in the State of Wyoming.¹² A description of the available variables in the Jackson data is presented in Exhibit 1. Exhibit 2 contains a description of the Wyoming data.

During the development of the two hedonic models, two criteria were used to eliminate sales from the analysis before final models were developed.¹³ The first criterion was that a property with a sale price greater than three standard errors above or below the predicted sale price was deleted from the data set. These sales were likely to have attributes that could not be priced with the model. This may be due to a lack of sufficiently detailed information regarding the property and/or incorrect sales data. The second criteria involved the calculation of Cook's distance for each property sale. An unusually large absolute value for Cook's distance (>1.00) for any given sale indicates that the property has one or more characteristics that are quite different from other sales, and whose presence has an unduly large influence on the overall predicted values coming from the model.¹⁴ This resulted in the removal of less than 5% of all available data. Final models were developed from the remaining sales and their associated characteristics.

Empirical Results

We first discuss the empirical results from the Jackson Hole data and subsequently the results of the Wyoming data. The empirical results from the Jackson data are

Exhibit 1
Description of Variables—Jackson Hole Data

Sale Price	<i>SPRICE</i> —Sale price <i>PRICE/ACRE</i> —Price per deeded acre
Real Property	<i>REAL</i> —Estimated dollar value of real improvements
Size	<i>ACRES</i> —Size in acres
Location	<i>L31, L32, L41, L42, L51, L52, L61, L62, L91</i> and <i>L92</i> —Dummy variables representing location
Date of Sale	<i>B89, B90, B91, B92, B93, B94, B95, B96, B97</i> and <i>B98</i> —Time variable for the beginning of the year
Scenic	<i>FAIR</i> —No view of the Tetons; less than average, perhaps effected by manmade effects <i>AVERAGE</i> —Poor Teton view/Average view <i>GOOD</i> —Teton view, plus other attributes <i>EXCELLENT</i> —Full Teton view; trees/water
Access	<i>PRIVATE</i> —Private road (poor condition) <i>GRAVEL</i> —County maintained (gravel) or private road (good to excellent condition) <i>PAVED</i> —County maintained (paved)
Water	<i>NONE</i> —No streams or Snake River footage <i>STREAMS</i> —Adjacent to a stream or stream running through property <i>SNAKE</i> —Snake River footage
Topo	<i>FLAT</i> <i>ROLLING</i> <i>SLOPE</i> —Slightly sloped or combination of rolling and sloped <i>STEEP</i> —Steeply sloped
Vegetation	<i>HAY</i> —Hay field <i>GRAZE</i> —Grazing land <i>TREES</i> —Some trees <i>MATURE</i> —Mature vegetation (lots of trees)
Development	<i>D0</i> —No potential (conservation easement; flood plane) <i>D1</i> —Limited <i>D2</i> —Prime <i>D3</i> —Already developed

shown in Exhibit 3 and the results from the statewide data are displayed in Exhibit 4. The adjusted R^2 for both sets of data indicate very good fitting models.

Jackson Hole Models

We formulate a hedonic model containing a zero-one dummy variable to account for the Crescent H sales that may have caused a structural shift in the market for rural real estate in the Jackson Hole valley. Setting the dummy variable to zero implies that the Crescent H 1300 acre and the subsequent thirty-five to forty acre sales from the subdivision of the Crescent H property had not occurred. Subsequently, when the dummy variable is set to one to identify Crescent H sales, the impact on property values including both the original Crescent H sale and the subsequent subdivision is observed.

Exhibit 2
Description of Variables—State Wide Data

Sale Price	<i>SPRICE</i> —Sale price <i>PRICE/ACRE</i> —Price per deeded acre
Real Property	<i>REAL</i> —Estimated dollar value of real improvements <i>REAL/ACRE</i> —Real improvements per acre
Size	<i>ACRES</i> —Size in deeded acres <i>DAUM</i> —Deeded AUMs
Location	<i>ECO3, ECO4, ECO5, ECO7, ECO8</i> and <i>ECO9</i> —Dummy variables representing location based on ecoregion
Scenic	<i>FAIR</i> —Dummy variable for farms/ranches with little or no scenic and/or recreational value <i>AVERAGE</i> —Dummy variable for farms/ranches with less than average scenic and/or recreational value <i>GOOD</i> —Dummy variable for farms/ranches with above average scenic and/or recreational value <i>EXCELLENT</i> —Dummy variable for farms/ranches with high scenic and/or recreational value
Grazing Leases	<i>BLM15AUM</i> —Section 15 BLM grazing lease AUMs <i>BLM3AUM</i> —Section 3 BLM grazing lease AUMs <i>STATEAUM</i> —State lease AUMs <i>FORSTAUM</i> —Forest Service grazing permit AUMs <i>PRVTAUM</i> —Private lease AUMs
Date of Sale	<i>B89, B90, B91, B92, B93, B94, B95, B96, B97</i> and <i>B98</i> —Weighted time variable for the beginning of the year listed
Quality of Land	<i>QUALITY</i> —The ratio of the number of <i>DAUMs</i> per <i>ACRES</i> ; designed to measure productivity

The use of a dummy variable in this model allows for the pricing of Jackson Hole real estate either with or without the impact of the Crescent H sales. The database including the Crescent H sales consists of 101 sales. This model is shown in Exhibit 3.

To allow for the comparison of the coefficients between the Jackson Hole model and the Wyoming agricultural valuation model, both models have been estimated where the intercept is forced through the origin.¹⁵ Examining the results shown in Exhibit 3, it is apparent that the significant factors are the date of sale, location, scenic, size, vegetation and water. Variables relating to access, topography and development were found to be statistically insignificant.

It is apparent that the dummy variable, *HDUMMY*, is very significant with a coefficient indicating that a premium of approximately \$88,000 per acre was paid for the Crescent H sales. This would suggest that a structural shift occurred in Jackson Hole land values due to these sales. Whether these sales represent an anomaly or whether a permanent shift in the value of Jackson Hole land values persists in the future can only be assessed by the impact of these few sales on future sales prices.

Exhibit 3
Jackson Hole Valley Data

Variable	Parameter Estimate	Standard Error	t-Statistic
<i>DUMMY</i>	87999***	7734.36	11.4
<i>HAY</i>	4267.15	3956.97	1.1
<i>TREES</i>	8251.16***	2179.44	3.8
<i>MATURE</i>	12727***	3045.80	4.2
<i>LDACRES</i>	-8744.78***	1172.62	-7.5
<i>STREAMS</i>	5266.24***	1958.67	2.7
<i>SNAKE</i>	1476.36	2462.48	0.6
<i>SCENIC-AVERAGE</i>	5607.57**	2846.40	2.0
<i>SCENIC-GOOD</i>	18426***	3201.29	5.8
<i>SCENIC-EXCELLENT</i>	18730***	4395.80	4.3
<i>L31</i>	14361***	5829.98	2.5
<i>L33</i>	6719.54	5271.39	1.3
<i>L41</i>	16016***	5747.17	2.8
<i>L42</i>	1266.00	5951.00	0.2
<i>L51</i>	8203.52*	6134.17	1.3
<i>L61</i>	24561***	5721.63	4.3
<i>L62</i>	6672.46	5449.85	1.2
<i>L91</i>	2325.47	6130.88	0.4
<i>L92</i>	8791.39*	6039.13	1.5
<i>L7</i>	5145.75	5351.67	1.0
<i>L10</i>	4059.51	5491.77	0.7
<i>B89</i>	16150**	8645.24	1.9
<i>B90</i>	32262***	8762.11	3.7
<i>B91</i>	28671***	8637.59	3.3
<i>B92</i>	38191***	8381.60	4.6
<i>B93</i>	30653***	8039.73	3.8
<i>B94</i>	37850***	7871.49	4.8
<i>B95</i>	35319***	8945.61	3.9
<i>B96</i>	33692***	7508.80	4.5
<i>B97</i>	40439***	7731.15	5.2
<i>B98</i>	21426*	14113.37	1.5

Note: The dependent variable = *Price Per Acre*. There are 101 observations. The R^2 is .9644.

* Significance between $\alpha = .2$ and $\alpha = .1$.

** Significance between $\alpha = .1$ and $\alpha = .05$.

*** Significance at $\alpha = .05$ level or higher.

Exhibit 4
State of Wyoming Data

Variable	Parameter Estimate	Standard Error	t-Statistics
<i>BLM15AUM</i>	<0.01	<0.01	0.3
<i>BLM3AUM</i>	<-0.01	<0.01	-0.5
<i>STATEAUM</i>	0.03***	0.01	3.1
<i>FORSTAUM</i>	0.04***	0.02	2.1
<i>PRVTAUM</i>	0.03	0.03	1.1
<i>LDACRES</i>	-46.88***	3.73	-12.6
<i>QUALITY</i>	45.56***	1.86	24.6
<i>REAL/ACRES</i>	1.52***	0.03	50.1
<i>SCENIC-AVERAGE</i>	59.16***	10.26	5.8
<i>SCENIC-GOOD</i>	141.56***	12.67	11.2
<i>SCENIC-EXCELLENT</i>	172.23***	20.29	8.5
<i>ECO3</i>	-136.60***	24.67	-5.5
<i>ECO4</i>	-100.26***	17.75	-5.7
<i>ECO5</i>	-88.79***	19.24	-4.6
<i>ECO8</i>	-69.11***	14.65	-4.7
<i>ECO9</i>	-61.82***	17.91	-3.5
<i>B89</i>	430.17***	42.80	10.1
<i>B90</i>	517.17***	33.00	15.2
<i>B91</i>	502.61***	33.64	14.9
<i>B92</i>	492.10***	32.34	15.2
<i>B93</i>	493.74***	32.88	15.0
<i>B94</i>	501.81***	33.84	14.8
<i>B95</i>	594.66***	33.39	17.8
<i>B96</i>	558.10***	35.59	15.7
<i>B97</i>	578.08***	41.41	14.0
<i>B98</i>	503.79***	104.48	4.8

Note: The dependent variable = *Price Per Acre*. The are 853 observations. The adjusted R^2 is .9377.

* Significance between $\alpha = .2$ and $\alpha = .1$.

** Significance between $\alpha = .1$ and $\alpha = .05$.

*** Significance at $\alpha = .05$ level or higher.

During the time period covered by this analysis, property values increased substantially. From 1989 to 1997, land prices in the Jackson Hole Valley increased by approximately 12% per year.¹⁶

Location in the Jackson area also has an impact on the price per acre. Areas L31 and L41, located in the northern part of the Jackson Hole Valley, closer to the Jackson

Hole ski area and Grand Teton Peak, has more value than land in the southern part of the valley represented by areas L62, L91 and L10.

The presence of a stream has value, adding approximately \$5266 per acre, yet footage along the Snake River typically has a much smaller impact.¹⁷

View of Grand Teton Peak has high value. Property with an excellent or good view of Grand Teton Peak is valued in excess of \$18,000 per acre more than property possessing little or no view.

As expected, land with mature trees or land with some trees is valued higher than grazing land with clear vistas. Land with mature vegetation sold for approximately \$12,700 more per acre and land with some trees at approximately \$8200 more per acre than grazing land with little vegetation. Hay land shows a value of \$4200 more than grazing land.

State Wide Results

The results from the analysis of the statewide data are displayed in Exhibit 4. In examining these results several findings are evident.

During the time period of this analysis (1989–1997), ranch values increased by approximately 3.8% per year. However, agricultural land values reached a peak in 1995 and have fallen approximately 15% since then. From 1989 to 1995, land values increased by approximately 5.5% per year and subsequently fell by approximately 5.3% per year.

Real property improvements add approximately 52% more value to the price per acre than estimated by the appraiser. Thus, buyers of agricultural properties are willing to pay a substantial premium for improvements.

Scenic/recreational value is very important to the farm or ranch even though these are non-productive attributes. Holding other attributes constant, buyers are willing to pay approximately \$172 more per acre for agricultural property with very scenic or recreational attributes as compared to the property with little or no scenic/recreation potential.

BLM leases and private leases do not appear to add value to the ranching operation. According to the model, both BLM Section 3 and 15 leases and private leases had statistically insignificant effects on the price per acre. It is expected that private leases have no value since they should be priced competitively, thus the same interpretation may be made with regard to BLM leases. The current price of BLM leases and the uncertainty regarding the future availability of these leases makes the buyer indifferent to their inclusion in the sale of deeded land.¹⁸

State and Forest Service leases add value to the ranch. The existence of a State lease AUM adds approximately \$0.027 per deeded acre, and a Forest Service lease AUM

adds approximately \$0.044 per deeded acre. Thus, an average ranch containing a state section (640 acres) with 224 AUMs will sell for approximately \$6.05 more per deeded acre than the same ranch without the state lease.

The quality or productivity of the land is an important factor where one additional AUM per deeded acre has a value of approximately \$45.

The ecoregion in which the property is located also has a significant impact on value. The model was constructed assuming that the land was located in Ecoregion 7, the same Ecoregion as Jackson Hole. Thus, the other ecoregions, 3, 4, 5, 8 and 9, all have negative coefficients that suggest that Ecoregion 7 in Wyoming has the highest land prices. This is the case even when Jackson Hole data is not included in developing this model.

As expected, the log of deeded acres has a negative coefficient. This suggests that larger farms and ranches will sell for less per acre, thus economy of scale exists.

Tax Consequences

Agricultural lands in Wyoming, as well as in most western states, are taxed on productivity rather than market value. However, previous research suggests that farm and ranch market values are based on numerous factors, of which, productivity is only one.¹⁹ Taxing agricultural land based on productivity may be reasonable if the highest and best use of the land is agricultural and the property is being used for that purpose. However, taxing agricultural land on the basis of productivity seems questionable when the market value far exceeds its productive value. This is the situation regarding property in the Jackson Hole Valley that is designated as agricultural land for tax purposes only, and is a similar situation for scenic/recreational agricultural properties located throughout the remainder of the state.

The practice of taxing agricultural land on productivity rather than market value is a form of differential assessment. Differential assessment is designed to reduce the effect of urbanization on specified types of land, to provide tax savings for the landowner, thus, providing an incentive to keep the land in rural use. It has been argued that with increasing property taxes on agricultural lands due to increases in tax rates and land values, the tax burden plays a dominate role in land use decisions. In essence, without some form of relief, taxes may be too high, given operating revenues generated by a pure farm or ranch, to sustain a viable operation. Operations with greater market values than productive values could potentially be forced to sell some or all of their lands. Although all states have adopted some form of differential tax treatment, little agreement exists as to any one "best" method or whether the resulting lower property tax has had an impact on land use decisions.

A counter argument for differential assessment suggests that taxing agricultural lands on the basis of productive value, especially land near a resort community, encourages suboptimal use. A farmer or rancher who is engaged in a traditional agricultural operation on land adjacent to a resort community that possesses substantial scenic,

recreation, development potential or other value causing the market value to far exceed its productive value, is consciously underutilizing and speculating on the investment potential of this resource. The direct tax subsidy given to these landholders undoubtedly increases the value of their landholdings to the detriment of society. There is little justification for society to subsidize these deliberate operations with lower property taxes where the subsidy will predominately benefit the individual landowner. A tax system based on productivity results in minimal taxes for farm or ranch owners who hold property for its other benefits, and as found in Wyoming, is subject to manipulation and inequity in taxes paid.²⁰ Conversely, farmers or ranchers with property possessing little scenic, recreation, development, or other value are being discriminated against since they are paying taxes on productive value that is very close to market value. These true agricultural operations will be assessed a higher mill levy and pay higher taxes due to fellow farmers and ranchers on more valuable land paying lower than equitable taxes.

Another argument favoring differential assessment is that farms or ranches use proportionally fewer public services as compared to private residences and therefore should be taxed at a lower rate. This argument is weakened because property taxes are value-added taxes. Assessed values are generally some percentage of market values. Property taxes are equitable where property of equal value located in a given taxing jurisdiction are taxed equally.²¹ Property taxes, as with most taxes, do not attempt to have each individual pay taxes based upon their use of public services. If, however, political entities wish to provide a differential tax treatment to agricultural lands, it should be accomplished by adjusting the mill levy on the market value of this type of property. This will at least provide horizontal equity among agricultural landowners.

We recommend that property speculation statutes to deal with non-agricultural uses of otherwise agricultural land be adopted. Two states, North Dakota and South Dakota, have adopted property speculation statutes to ensure that the agricultural preferential programs are not being abused by developers or subsidizing lands being bought for their recreational value and/or scenic vistas and not for their agricultural value. We recommend the adoption of South Dakota's 1993 HB 1016 which states, "Any agricultural land, as defined in 9 10-6-31.3, which sells for more than 150% of its agricultural income value is hereby classified for purposes of ad valorem taxation." Thus, any otherwise classified agricultural property that would normally be taxed on the basis of productive value will be taxed on the basis of market value if the property sells for more than 150% of productive value. Hence, a farm or ranch, until it is sold, remains classified as agriculture land regardless of its market value.²² An advantage of this test is that it tends to preserve the sanctity of farm and ranch operations, a taxing policy goal generally of most states.

Conclusion

This article examines the valuation process for real agricultural properties located near resort communities and compares this to the valuation process for ordinary agricultural land. In addition, we examine the impact that differential tax assessment systems may

have on these two types of land. We introduce hedonic models, multiple regression models, for valuing real estate property located in the Jackson Hole Valley of Wyoming and for agricultural properties located throughout the remainder of Wyoming. The attributes and the form of the hedonic model used to value resort properties are significantly different when compared with the hedonic model used to value farm and ranch land located throughout the remainder of the state. This is the case even though much of the property being valued in the Jackson Hole Valley is currently being used and taxed as ranch land.

Comparing land values in the Jackson Hole Valley relative to agricultural land values throughout the remainder of Wyoming, land in Jackson Hole averages approximately \$22,463 per acre. However, agricultural land throughout the remainder of the state averages \$344 per acre. Resort properties derive their values from attributes such as scenic and recreational amenities relative to neighboring resort properties, the existence of streams on the properties, the type of vegetation and the general relative location in the Jackson Hole Valley. Alternatively, agricultural lands located throughout the remainder of the state derive value from a combination of productive and nonproductive attributes. Productive attributes include the productivity of the land as measured by the number of animal unit months per acre, the availability of public grazing leases and the ecoregion in which the farm or ranch is located. Not surprisingly, the relative scenic and recreational qualities of farms and ranches also have a substantial effect on value. Very scenic agricultural properties and/or those properties possessing considerable recreation potential may sell for multiples of properties that do not possess scenic and/or recreational potential.

In examining both the Jackson Hole data and the agricultural land sales data from the remainder of the state, we found that many sales contained agricultural properties being acquired for purposes other than farming or ranching. Often this was for hunting/fishing, scenic qualities or for future development. For agricultural lands that are held only for farming or ranching, we have no major concern with taxing the property based on production; however, to support non-productive use of this land with property tax subsidies is another issue. We propose that a more stringent test be applied for classification as agricultural property—that of requiring the farm or ranch to possess a reasonable probability of being a viable entity if operated solely as an agricultural operation. If a farm or ranch is sold for considerably more than its productive value, it is not a viable agricultural entity and should not be taxed as an agricultural unit. A farm or ranch, when sold, would be subject to the test, as described above; however, until it is sold, it remains classified as agriculture land. This test will also tend to preserve the sanctity of farm and ranch operations, which generally has been a taxing policy goal of most states.

Notes

¹ Some of the properties in the state have grazing leases, either public or private. In these cases the acres used in the denominator of this equation do not include these leased acres.

² An AUM (Animal Unit Month) is the amount of forage needed to sustain a one-thousand pound cow with calf, a horse or five sheep for one month's time (U.S. General Accounting Office, 1992).

³ Several counties in Wyoming currently use MRA to value residential property for assessment purposes. MRA has also been used in Wyoming to value residential vacant land.

⁴ In several situations, there were a small amount of improvements that were included in the sale. In these cases, we deducted the estimated value of these improvements from the sale price to arrive at an adjusted sale price of the vacant land.

⁵ We also had sales of parcels smaller than thirty acres, but decided not to consider them. As a result, they are not part of our data set.

⁶ Teton County is the home of Yellowstone National Park. Ranches in this county are excluded due to their high value that has little, if anything, to do with ranching. It is Teton County that is represented in the Jackson Hole Valley data.

⁷ For example, see Martin and Jefferies (1966), Winter and Whittaker (1981) and Sunderman and Spahr (1994).

⁸ Torell and Fowler (1986) and Thompson (1988) found that prices of ranches were increasing. Vanvig and Gleason (1988) found that this also applies to Wyoming. Given the nature of the Jackson Hole market, we also anticipated price movement.

⁹ Alternative approaches were considered for controlling for the date of sale. One approach is to perform a separate regression for each of the years during which sales took place. A combined model is then estimated using implied prices for each of the property characteristics across the different regressions. This approach will provide demand curves in the different markets. This approach requires that a sufficient quantity of data exists for each year of the study to allow reasonable degrees of freedom for each regressions. Given the size of the sample, the authors determined that additional methods of controlling for the date of sale are unwarranted.

¹⁰ This subjective assessment of scenic and/or recreational value was determined by the authors with assistance of farm and ranch appraisers in Wyoming. Even though the variables names used are the same between the Jackson data and the Wyoming data, the quality of scenic and/or recreational value cannot be compared between the two data sets.

¹¹ The importance of federal land to western states should be recognized. In eleven western states, excluding Alaska, the percent of federally owned land ranges from 29% to 86% (Wyckoff, 1977). In Wyoming, 64% of the state consists of public land (USDA and USDI, 1986).

¹² In a recent study on data from Wyoming, Bastian and Hewlett (1997) found that the AUMs per acre ranged greatly across the state. For example, grazing land had a statewide productivity of 0.29 AUMs per acre. On the other hand, irrigated cropland had a measure of productivity of 9.19.

¹³ This approach was used by Birch and Sunderman (1997).

¹⁴ See Neter, Wasserman and Kutner (1983) for a discussion of this concept.

¹⁵ Normally, hedonic or other econometric models would require an intercept term that absorbs the effects of omitted variables. However, we forced the intercept through the origin because agricultural properties with all attributes at zero should sell for a zero price.

¹⁶ The date variable *B98* is not reliable since the major sales were in the early part of 1997.

¹⁷ The Snake River is well named. Through the Jackson area it is a small stream during most of the year and a ragging torrent in the spring. As a result, the river bed tends to be a very wide bed of debris and gravel within which the river meanders. In many locations, dikes are built to keep the river from spreading further outside its already wide banks. In short, the Snake River is not as beautiful as might be thought. Further, land ownership extends to the "thread" of the river. As a result, in your land holdings you might have several acres of unuseable land that has no other use than as a buffer from others.

¹⁸ For a discussion, see Sunderman and Spahr, 1994.

¹⁹ For example, Sunderman and Spahr (1994) found that ranches in Wyoming had value attributed to grazing leases. Others such as Martin and Jefferies (1966), Winter and Whittaker (1981), Torell and Fowler (1986) and Torell and Doll (1991) and have observed the same findings in other western states. Spahr and Sunderman (1995) have also found significant value attributed to scenic and recreational value.

²⁰ See Spahr and Sunderman (1998).

²¹ For a discussion of forms and potential causes for property tax inequity see Birch, Sunderman and Hamilton (1992) and IAAO (1990).

²² As an added incentive to maintain the sanctity of agricultural property and an incentive to prevent commercial development, property taxes based on market value may be assessed retroactively, for example for the previous five years, on agricultural property if sold above 150% of productive value.

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