

Comparing Hunting Lease Prices: A Price Decomposition Approach²⁶

by

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Abstract

Landowners in the coastal and Delta regions of Mississippi were surveyed to determine hunting lease prices in each region. Lease prices in the Delta averaged \$2,317 more than lease prices in the coastal region, a 60% difference. Hedonic hunting lease price equations were used to decompose this price difference into differences due to the characteristics of the lease and differences due to the valuation of the characteristics. Both components explain a portion of the price difference. Hunting leases are, on average, 25% larger in the coastal region; however, per acre values for agricultural, forested, and other acres were all substantially higher in the Delta. In contrast, landowner expenditures on wildlife habitat increased landowner revenues and profits in the coastal counties but did not affect lease prices in the Delta.

Key words: Hunting leases, hedonic prices, lease characteristics, Mississippi Delta, price decomposition

²⁶ Approved for publication as Journal Article No. FO-393 of the Forest and Wildlife Research Center, Mississippi State University.

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INTRODUCTION

Hunting leases can be an important source of income for private landowners (Southwick 2003); however, lease prices can vary substantially as evidenced by lease prices reported by Timber Mart-South (2004). Per acre prices depend on various factors such as cover type or land use, abundance and diversity of game species, and additional amenities that landowners may provide (Loomis and Fitzhugh 1989; Hussain et al. 2004). Lease prices often vary substantially between regions, states, and even within states (Jones et al. 2001, Timber Mart-South 2004). Understanding why leases prices vary between specific regions is important for a number of reasons. Knowing what drives lease prices would enable landowners to maximize lease revenues by modifying relevant lease characteristics under their control. Furthermore, landowners could take advantage of public and private assistance programs that enhance high value lease characteristics. Public policies favoring wildlife-based economic development depend on accurate information regarding factors that determine lease values.

Leases can be viewed as differentiated goods that vary in terms of size, habitat quality, game species, and location. Because lease prices are a function of such characteristics embodied in the lease, the hedonic model (Rosen 1974) is appropriate for analyzing lease prices. Price differences between similar differentiated goods occur because the: (1) characteristics of the goods differ, and (2) characteristics are valued differently. Hunting lease prices can be decomposed into these two components. Price decomposition was originally developed to examine wage differentials between people working in similar occupations. See, for example Oaxaca (1973), Blinder (1973), and Jones (1983). The objective of this study is threefold: (1) determine average hunting lease prices in two Mississippi regions, 2) decompose the differences in the regional lease prices into differences in characteristics and differences in the valuation of characteristics, and (3) identify opportunities for landowners to enhance their lease values.

METHODS

Study Area

Four counties in the lower Mississippi Delta (Warren, Issaquena, Sharkey and Washington) and six coastal counties (Hancock, Harrison, Jackson, Pearl River, Stone, and George) comprised the two study regions. The lower Mississippi Delta counties lie primarily in the Mississippi Alluvium physiographic region with western Warren County lying in the Upper Thick Loess region. The coastal counties encompass the Gulf Coast Flatwoods Region and portions of the Lower Coastal Plain. Land-use differs dramatically between the study regions. Agriculture is the primary land-use in the Delta counties with forests covering only 40% of the region. In the coastal counties, timber production is the primary land-use and forests cover 76% of the region (Hartsell and London 1995).

Data

Hunting lease information was obtained by surveying landowners in the two regions. Names and addresses of landowners were obtained from the county tax rolls. In 1997, mail surveys were sent to approximately 1,300 Delta landowners who owned 40+ acres. A single follow-up mailing was sent to all non-respondents, approximately two weeks after the initial mailing. In 1998, mail surveys were sent to approximately 2,000 Delta landowners who owned 40+ acres. No follow-up mailing was sent. The survey instrument solicited information about the amount and composition by land-use of land included in hunting leases, wildlife species included, and wildlife and habitat management-related expenditures.

Analysis

Hedonic price equations for regional hunting leases were modeled as:

$$(1) \quad P^D = X^D \beta^D + \varepsilon^D$$

$$(2) \quad P^C = X^C \beta^C + \varepsilon^C$$

where

- P = the average hunting lease price for a region,
- X = a vector of characteristic means,
- β = a vector of characteristic coefficients for the regional hedonic price equations,
- ε = a normally distributed error term and,
- C and D superscripts represented the coastal and Delta regions, respectively.

Average lease prices and hedonic price equations were estimated for each region. The empirical specification of the hedonic lease price is:

$$(3) \quad \text{Lease Price} = f(\text{land characteristics, lease characteristics, landowner effort})$$

where land characteristics included the number of acres of forested, agricultural, and other acres and the % wetlands included in the lease; lease characteristics included whether waterfowl, major game species (deer *Odocoileus virginianus* and turkey *Meleagris gallopavo*), and minor game species (squirrel *Sciurus spp.*, dove *Zenaida macroura*, quail *Clinus virginianus*, rabbit *Sylvilagus spp.*) were included in the lease; and landowner effort was the dollars spent on wildlife management.

The difference in average prices was decomposed into differences due to characteristics (DDC) of the leases and differences due to valuation of the characteristics (DDVC) as follows:

$$(4) \quad \Delta P = X^D b^D - X^C b^C$$

where

- ΔP = the difference in average regional lease prices and,

b = a vector of estimated characteristic coefficients for the regional hedonic price equations estimated from the data.

By adding $X^D b^C - X^D b^C$ to the right hand side and rearranging terms, we have

$$(5) \quad \Delta P = (X^D - X^C)b^C + X^D(b^D - b^C)$$

$$(6) \quad \Delta P = DDC + DDVC$$

Thus, DDC was equal to the difference between the regional characteristic means times the coastal region hedonic price for the respective characteristic and DDVC was equal to the difference in the regional hedonic prices for each characteristic times the mean value of the respective characteristic for the Delta region.

RESULTS

The survey response rate averaged 30% for both regions after adjusting for surveys returned for incorrect addresses, deceased landowners, and property sales. Leasing hunting rights was more common in Delta counties (14% of respondents) than coastal counties (8% of respondents). Coastal respondents leased hunting rights on 73% of their land while Delta respondents leased 52% of theirs. Most of the unleased portion was agricultural land. Annual lease revenues averaged \$6,112 per landowner in the Delta, \$2,300 more than in the coastal counties (Table 1). The average acres leased per landowner was 25% larger in coastal counties (1,291 ac) than in Delta counties (973 ac). Coastal county leases were almost exclusively forest land while 30%, on average, of Delta leases were agricultural and other land. Deer and turkey were included in approximately 90% of leases in both regions. Game species such as quail, dove, squirrel, and rabbit were included in approximately 45% of leases in both regions. Waterfowl were more frequently included in Delta county leases (55%) than in coastal county leases (28%).

Table 1. Mean variable values for hunting leases in six coastal and four Delta counties of Mississippi reported by survey respondents for the 1996-1997 and 1997-1998 hunting seasons.

Variables	Coast (n = 69)	Delta (n = 39)
Annual Revenues (\$)	3,795	6,112
Forested acres	1,250	690
Agricultural acres	5	168
“Other” acres	36	115
% wetland	1.5	0.8
Waterfowl	0.28	0.55
Deer and turkey	0.95	0.87
Other species	0.44	0.46
Wildlife mgt. expenses (\$)	488	3,737

Only two coefficients for characteristics in coastal county leases were statistically significant²⁷ in the estimated hedonic price equation (Table 2). Each forested acre contributed \$2.05 to the total lease price. Wildlife management expenditures increased total lease prices by \$1.26 for every dollar spent. In the Delta region, all land characteristics were statistically significant in the estimated hedonic price equation. Each agricultural acre contributed \$8.00 to the total lease price; each forested acre contributed \$4.91; and acres in other land uses contributed \$4.71. For each 1% increase in wetlands as a percent of the total leased acres, lease prices increased \$810.44 in the Delta region but had no significant effect in the coastal region. Wildlife species included in the lease were not significant in either region.

Table 2. Estimated coefficients for hedonic price equations for hunting leases in six coastal and four Delta counties of Mississippi based on survey responses for the 1996-1997 and 1997-1998 hunting seasons.

Variables	Coast (n = 69)	Delta (n = 39)
Intercept	405.05	951.39
Forested acres	2.05*	4.91*
Agricultural acres	-1.38	8.00*
“Other” acres	2.61	4.71*
% wetland	11.76	810.44*
Waterfowl	187.76	610.21
Deer and turkey	-22.62	-2,114.47
Other species	148.06	1,261.22
Wildlife mgt. expenses	1.26*	0.03

* significantly different than zero at $\alpha = 0.10$.

The price decomposition analysis revealed that price differences were due primarily to land characteristics; however, in some instances, the differences due to characteristics and differences due to valuation of characteristics were partially offsetting (Table 3). Consider forested acres, for example. Hunting leases in the Delta counties had, on average, 560 fewer acres of forested land than their coastal counterparts. Evaluated at the coastal county price for forestland of \$2.05/ac, 560 fewer forested acres should reduce Delta lease prices by an average of \$1,480 relative to coastal lease prices; however, forested acres in Delta counties were valued at \$2.86 more per acre (\$4.91 versus \$2.05) thereby increasing Delta lease values by \$1,973. The net impact of forested acres was to increase Delta lease values by \$825 relative to coastal lease prices. Agricultural acres were both highly valued in the Delta and represented a larger component of Delta leases compared to coastal counties, thereby increasing Delta lease prices by \$1,351. This amount was the largest total for any of the characteristics with at least one significant coefficient. Note that if both coefficients, i.e., corresponding coefficients for Delta and coastal counties, were not significantly different from zero, then the difference in lease prices due to that characteristic could be assumed to be minor despite the magnitude of the estimated value, e.g., differences in lease values due to including deer and turkey in a lease.

The amount of other acres and % wetland increased Delta lease values while wildlife management expenditures, although greater in the Delta, had a smaller impact on Delta lease

²⁷ $\alpha = 0.10$ was used for all tests of statistical significance.

values. In total, forested, agricultural, and “other” acres increased Delta lease prices by an average of \$2,624. Other characteristics combined to reduce this total by approximately \$300.

Table 3. Decomposition of annual hunting lease price differences between Delta and coastal counties in Mississippi into differences due to characteristics (DDC) and differences due to valuation of characteristics (DDVC) based on survey responses for the 1996-1997 and 1997-1998 hunting seasons.

Characteristic	DDC	DDVC	Total
	\$	\$	\$
Intercept	0	546	546
Forested acres	(1,148)	1,973	825
Agricultural acres	(225)	1,576	1,351
“Other” acres	206	\$242	448
% wetland	(8)	\$639	631
Waterfowl	51	232	283
Deer and turkey	2	(1,820)	(1,818)
Other species	3	512	515
Wildlife mgt. expenses	4,094	(4,597)	(503)
Total	2,975	(687)	2,278

SUMMARY

Hunting lease prices often differ substantially from region to region. This study examined differences in hunting lease prices between two Mississippi regions using price decomposition, a technique developed by labor economists to analyze wage differences between segments of the labor force doing similar jobs. Hedonic price equations were estimated for hunting leases in both regions. In the coastal region, only the number of forested acres and wildlife management expenditures had a statistically significant effect on lease prices. In contrast, the number of forested acres, agricultural acres, other acres, and % wetland had a statistically significant effect on lease prices in the Delta region.

Annual lease prices in the Delta averaged \$2,300 more than annual lease prices in the coastal region. This price differential was decomposed into differences in characteristics embodied in the leases and differences in valuation of these characteristics. Price decomposition revealed that, although coastal county leases averaged 300 acres larger than leases in the Delta region, all types of land were valued much higher in the Delta. This premium accounted for almost all of the net difference in lease prices.

Also of interest is the effect of wildlife management expenditures. Landowners spent over seven times as much on wildlife management in the Delta as in the coastal region, yet coastal landowners received a greater return on their money in terms of increased lease prices. The impacts of greater expenditures for wildlife management in the Delta were more than offset by greater returns on wildlife management expenditures in the coastal counties. The net effect of wildlife management expenditures on lease prices was \$503 less in the Delta region than in the coastal region. In summary, price decomposition of lease prices in this study showed that simply

comparing average lease prices or coefficients from hedonic price equations can miss key factors influencing lease prices.

DISCUSSION

Based on these findings, landowners can potentially improve lease prices in two ways. In coastal counties, landowners should explore ways to improve wildlife habitat. Investment in habitat improvement generated a 26% return. In contrast, relatively high wildlife management expenditures in the Delta which resulted in virtually no increase in the average lease price, suggested that some minimal amount of habitat management by the landowner was necessary before properties could be leased. Landowners should also consider including more land in the leases. In the coastal region, adding forested acres increased lease prices. In the Delta region, adding agricultural land had the greatest impact; however, adding acres of any type increased lease prices. In both regions, landowners did not lease all their land. Whether the unleased portions were reserved by the landowner to minimize damage to crops and essential infrastructure such as roads and levees, or were not wanted by the hunting clubs is not clear from this analysis and warrants further investigation. Other issues that deserve further attention include: 1) a finer breakdown by land use type, e.g. pine versus hardwood forest types, rice versus other row crops, 2) the impact of pre-selection, i.e., which landowners lease and which landowners don't, and 3) for landowners that do lease, what determines how much of their total ownership is leased.

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