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Competition for National Forest Timber in the Northern, Pacific Southwest, and Pacific Northwest Regions

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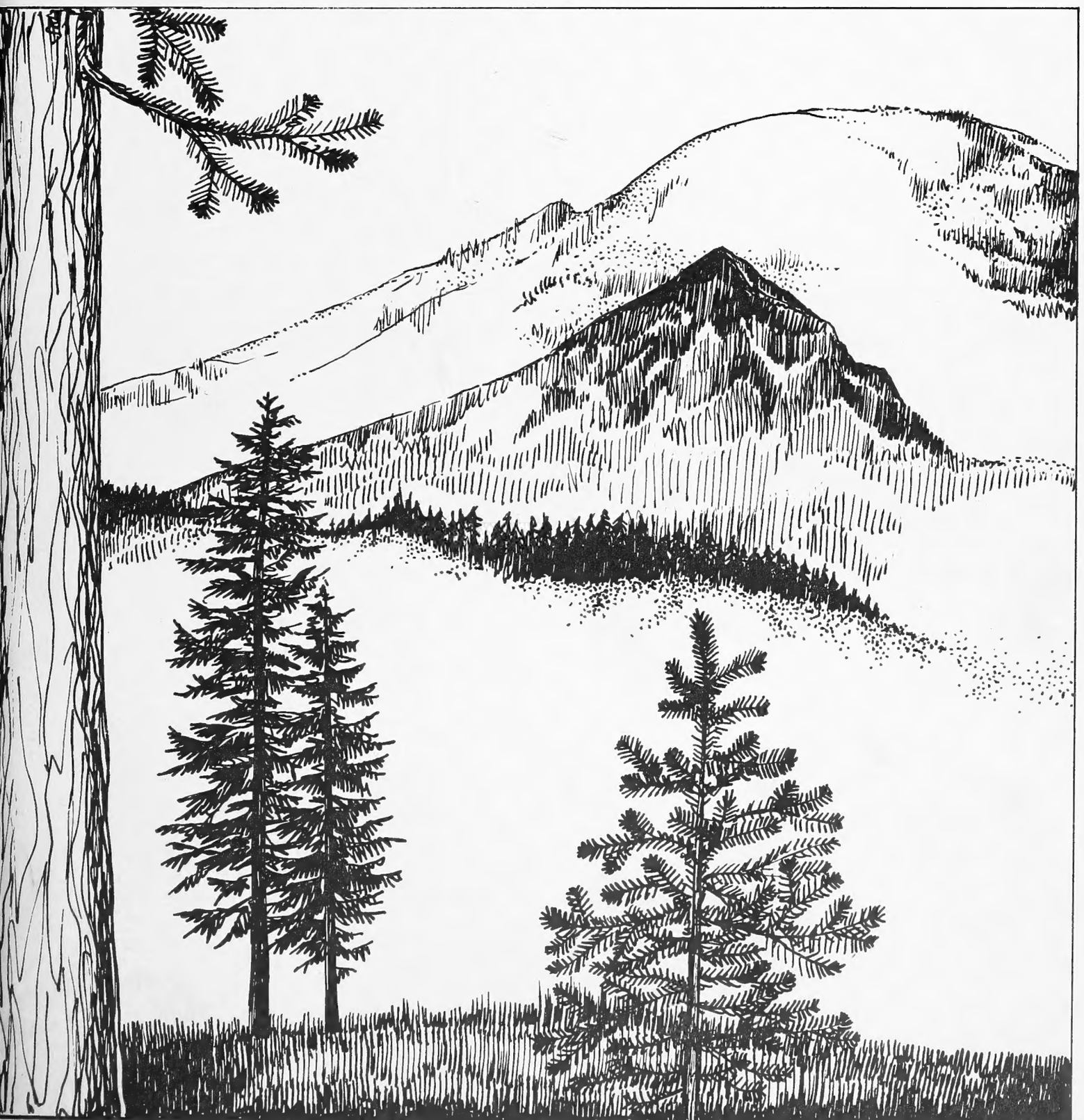

COMPETITION FOR NATIONAL FOREST TIMBER IN THE NORTHERN, PACIFIC SOUTHWEST, AND PACIFIC NORTHWEST REGIONS

Reference Abstract

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Competition for National Forest timber was examined in the Northern, Pacific Southwest, and Pacific Northwest Regions of the Forest Service, U.S. Department of Agriculture. The impacts of sealed bidding and the Small Business Set-Aside Program were found to vary widely among the different appraisal zones. Noncompetitive sales were screened for collusive activity; and in general, little indication was found of such activity.

KEYWORDS: Stumpage sales arrangement, National Forest administration, stumpage prices.

RESEARCH SUMMARY

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Competition for National Forest timber was examined under the assumption that timber sales have quality aspects influencing how prospective bidders judge the potential profitability of a sale. Bidder activity and bid prices varied directly with potential profitability and responded either to changes in quality aspects or to changes in administrative variables.

Two issues examined have the potential to alter the administrative variables and hence bid prices and bidder activity. The first issue was the congressional mandate requiring the use of sealed bidding on USDA Forest Service timber sales. In general, sealed bidding increased competition and bid prices for National Forest timber in areas that historically have experienced relatively limited competition. In areas where competition was vigorous, sealed bidding had little impact. Further, there was little indication that the mix of oral and sealed bidding implemented in 1977 had much impact on overbid compared with the preceding 2 years or that sealed bidding had much impact on the incidence of outside bidders. The second issue dealt with equity considerations in the Small Business Administration Set-Aside Program. The USDA Forest Service tries to give equitable treatment to large and small firms in administering its sale program. This treatment, however, seems highly variable throughout the study area. In some areas, set-aside sales had greater potential profitability than open sales, but bid prices for these sales did not reflect the increased profitability. In other areas, prices for timber on set-aside sales did reflect differences in timber quality.

A related issue examined, which has limited impact on bid prices or bidder activity, was the problem of screening sales for collusive activity. In general, little indication was found of collusive activity. Most noncompetitive sales are noncompetitive because they appear to bidders to have a low potential profitability.

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INTRODUCTION

The Forest Service, U.S. Department of Agriculture, is the major single supplier of stumpage, accounting for roughly 25 percent of domestic wood needs. National Forest timber is sold in open auctions to the highest bidder at a price not less than an appraised price determined by subtracting cost of production and a margin for profit and risk from the estimated selling value of an average mix of products that can be manufactured from the timber. Until 1977, National Forest timber sales were conducted by the USDA Forest Service using either sealed bidding or oral bidding procedures, depending on the competitive situation, business conditions, and local preferences. Sealed bidding methods were used in the East and oral bidding methods in the West, though not exclusively. Since 1971, the revised Small Business Administration Set-Aside Program has limited the bidding on a predetermined share of sales to small forest products firms.

In the past few years, three issues have come to the forefront concerning bidding practices on National Forest timber sales. The most important issue and the most controversial has been the impact of a congressional mandate requiring the use of sealed bidding on all sales (U.S. Laws, Statutes, etc. 1976). Although not easy to define, the magnitude of the impact was thought to be great in areas where oral auctions had been the dominant sale method. The second issue has been the problem of establishing procedures for screening sales for collusive activity. The congressional action requiring sealed bidding also requires "adequate monitoring systems" (U.S. Laws, Statutes, etc. 1976). The third issue concerning the USDA Forest Service sales program deals with equity considerations in the Small Business Administration (SBA) Set-Aside Program. Large firms contend that the program is biased in favor of the small participating firms. Small firms have raised questions about the usefulness of the program because of the possibility that set-aside sales may cost more than open sales.

These issues can be concisely stated in three questions:

1. What was the impact of sealed bidding?
2. Can sales be screened for unusual bidding patterns?
3. Are set-aside sales typical of all timber sales?

The purpose of this paper is to first assess the concerns regarding each issue and then to identify hypotheses for evaluating arguments for and against each concern. Then the identified hypotheses will be tested and policy implications drawn from the results.

The existing studies on competition for Federal timber (Mead and Hamilton 1968, Wiener 1969) provided little help in resolving these issues as they were out of date. The only study using recent data was not widely available and pertained only to northern Idaho and Montana.[1/]

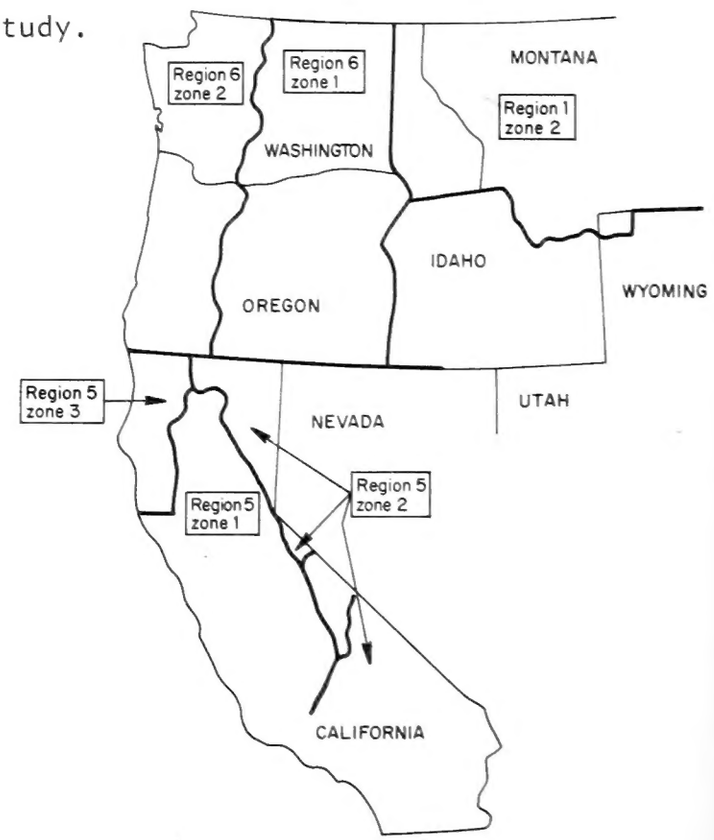
[1/] Johnson, Ronald Nils. 1977. Competitive bidding for federally owned timber. Ph. D. thesis. Univ. Wash., Seattle. 175 p., illus.

This study differs from earlier studies in that sales are viewed as having quality aspects that influence how prospective bidders judge the potential profitability of a sale. Potential profitability is not the sole determinant of bidder response; other factors, such as scarcities of local raw materials may lead to responses inconsistent with perceived profitability. In this study, however, bidder activity and bid prices are generally assumed to vary directly with potential profitability. The goal of analysis then is to examine how bidders (as measured by either amount of bid or number of bidders) respond either to changes in the quality aspects or to changes in administrative variables, such as the bidding method.

This study concentrates on Regions 1, 5, and 6 (Northern, Pacific Southwest, and Pacific Northwest) which account for roughly 83 percent of the total National Forest sawtimber harvest. All analyses are conducted by appraisal zones.[2/] These zones are shown in figure 1 and will be referred to as Region 1 zone 2 (northern Idaho and Montana west of the Continental Divide), Region 6 zone 1 (eastern half of Washington and Oregon), Region 6 zone 2 (western half of Washington and Oregon), Region 5 zone 3 (northern California), Region 5 zone 1 (west Sierra area), and Region 5 zone 2 (east Sierra area).

[2/] Appraisal data are developed for broad zones of similar types of timber and operating conditions. Operators in these zones are assumed to have similar cost structures and receive about the same prices for products.

Figure 1.--Areas included in the study.



The format of this paper is to discuss first the available sales data, the theory of competition, and background information on bidding practices; then each issue and the methods used in the analysis; and last, the policy implications as they pertain to the USDA Forest Service sales program.

Definitions and Available Data

The sale price of a National Forest timber sale will be referred to as the bid price and is expressed on a per-thousand-board-foot (Scribner) basis. The bid price for a particular sale is the weighted average price of all species on the sale--where the weighting for each species is based on the ratio of the volume of that species to the total sale volume. In this study, the bid price is adjusted for road costs for which the purchasers receive a credit. The adjusted bid price is commonly referred to as the statistical high bid.

In the past, studies describing the state of competition for Federal timber used the bid-appraisal ratio as a measure of competition. For an individual sale, this is the weighted average bid price for the timber in a given sale divided by the weighted average appraised stumpage price for the same timber. The bid-appraisal ratio is used to classify sales as either competitive or noncompetitive, depending on the size of the ratio. Mead and Hamilton (1968) used the bid appraisal ratio to isolate token bid sales where evidence of serious bidding is lacking. They also classified sales with only one bidder as noncompetitive.

In this study, a slightly different price variable is used in classifying sales as competitive or noncompetitive. This price variable is bid price minus road costs and appraised stumpage. It will be referred to as overbid. Overbid was used because it provides a cardinal measure of competition. That is, it provides an absolute (or real) measure as well as a consistent measure. Bid appraisal ratios provide only an ordinal measure in that the assigned value is only relative to other sales observed at the same time. This distinction is important if differential rates of inflation are recognized in the cost and price elements leading to the appraised price and in the premium that bidders are willing to pay for the timber on a sale.

The effects of differential rates of inflation can be illustrated by an example. Suppose four sales were equal in size, species, and appeal to bidders; one sale was offered each year; there was 10-percent inflation in the appraised price; and no inflation in overbid. The changes in major variables of interest are shown in the following tabulation:

Year	Appraised price	Overbid	Total bid	Bid-appraisal ratio
	(Dollars per thousand board feet)			
1	39.00	35.00	74.00	1.90
2	42.90	35.00	77.90	1.82
3	47.20	35.00	82.20	1.74
4	51.90	35.00	86.90	1.67

As shown, the bid-appraisal ratio declines as a result of inflationary changes in the appraised price. This decline illustrates the point implied that the bid-appraisal ratio provides only a relative measure at any point in time.

This example could have been constructed to maintain a fixed bid-appraisal ratio for each sale if overbid had been assumed to increase in real terms at the same rate as the appraised price. The choice, therefore, between overbid and bid-appraisal ratio as the better measure of competition, depends on what one assumes about differential rates of inflationary changes in prices, costs, and total bid. In this study, differential rates of inflation are assumed and overbid is used as the measure of competition.

In this study, sales were defined as noncompetitive if their overbids were less than one-half of 1 percent of the average overbid for the appraisal zone in which the sale is located. For example, a sale taking place in fiscal year 1976 would be noncompetitive in Region 6 zone 2 if the overbid is less than 59 cents per thousand board feet (MBF). This definition includes sales that would be classified as noncompetitive by the bid-appraisal ratio. For example, Mead and Hamilton (1968) classified sales as noncompetitive if the bid-appraisal ratio was less than 1.01. In the case of Region 6 zone 2, the overbid corresponding to a bid appraisal ratio of 1.01 would be approximately 32 cents per thousand board feet.

The analysis of several aspects of the sealed bid issue required that each of the six appraisal zones be rated, based on the degree of competition generally found on the timber sales in that zone. Mead (1967) used the percent of sales he classified as competitive as a measure of competition. A similar measure would be the ratio of volume sold in competitive sales to the total volume sold. The results of both Wiener's (1969) and Mead and Hamilton's (1968) studies suggest an alternative measure of competition--the difference in sale sizes between competitive and noncompetitive sales. Both studies considered Region 6 zone 2 as extremely competitive and found that for that zone noncompetitive sales were smaller than competitive sales. Differences in sale size between competitive and noncompetitive sales were tested by a t test to determine whether the mean volume of competitive sales were equal to the mean volume of noncompetitive sales.[3/] The results for all three methods are shown in the tabulation:

[3/] Significant test results require a t statistic of greater than 1.98 (assuming the number of observations is greater than 120). Unless otherwise specified, the 5-percent level of significance is used throughout this paper. This means that if the means are equal, the probability of obtaining significant results are only 5 percent.

Region	Zone	Percent competitive sales	Percent competitive volume	t-statistic for test of means
1	2	0.731	0.667	1.96
5	1	.840	.863	-.93
5	2	.898	.921	-.66
5	3	.876	.915	-1.21
6	1	.563	.571	-.33
6	2	.940	.974	-4.56

Region 6 zone 2 is obviously competitive; Region 1 zone 2 and Region 6 zone 1 less competitive. No clear-cut distinctions are possible in Region 5 as the percent measures indicate active competition, but the test of sale size means does not support the conclusion.

The data base for the analysis consisted of National Forest timber sale data for fiscal years 1975 and 1976 and calendar year 1977. Complete records are available for each sale made in the National Forest System. For each sale, these records include variables identifying the sale, the physical characteristics, the costs used in appraising the sale, and the bidders and various bid prices. From an empirical standpoint, the sales characteristics and cost variables are important because they measure the quality of the timber sale, and this may influence bidder activity and bid prices. A list of variables available from each sale and used in subsequent analysis follows:

Physical characteristics:
- Volume per acre
- Volume
- Percent major species
- Percent fiber (Region 6 only)
- Haul distance

Costs and prices associated with the sale:
- Appraised stumpage
- Selling value
- Logging
- Manufacturing
- Road

Bidder-related variables:
- Number of bidders
- Overbid (price paid minus road costs and appraised stumpage costs)
- Size class of purchaser

Administrative variables:
- Type of sale--salvage, competitive, or set-aside
- Sale method
- Region, forest, zone, district, and sale number
- Quarter and month of the sale
- Termination period

This data base will support statements made about the events during 1974-77 in Regions 1, 5, and 6 and inferences about possible events in those Regions during nonsampled years. The data base will, to some degree, support statements extrapolating the experience in the sampled Regions to other Regions. These latter statements may be subject to considerable error, depending on the sale characteristics in the Regions in question.

Some of the data listed were either computed or summarized from data appearing in the sale records (which are abbreviated facsimiles of the standard sales form 2400-17). The volume-per-acre variable, for example, is computed by dividing total sale volume by the reported sale acreage. In many cases, the reported acreage includes both the area of timber cut plus uncut acreage, buffer strips, etc. This results in per-acre figures that are biased downward, but the bias should be uniform within a given appraisal zone since all sales are appraised by common methods. The major species variable measures the percent of the total sale volume accounted for by a specified species. The specified species varies by appraisal zone as shown in this tabulation:

	Zone		
Region	1	2	3
1		Douglas-fir	
5	Pine (except lodgepole)	White fir	Douglas-fir
6	Pine (except lodgepole)	Douglas-fir	

The measure for fiber is the percent of total sale sawtimber not suitable for grades 1, 2, or 3 saw logs, including undersize material, hardwoods, and dead and down material. Cost and price variables are volume-weighted averages for each sale and are expressed on the basis of per thousand board measure, Scribner scale. The number-of-bidders variable includes all bidders who qualified to bid. Other measures of number of bidders were tried, such as number of active bidders, but these measures proved to be highly correlated. The size class of the purchaser refers to whether the purchaser is a small business (less than 500 employees) or a large business. Other variables need no explanation.

Two types of sales were deleted from the analysis. First, all sales taking place within sustained yield units were deleted. The timber sales on these units either go to a specific firm at the appraised price or are sold in open competition to firms who will process the timber within the unit. In either case, the sales do not reflect a freely operating market.

There are several of these areas in the West, and the largest involved 127.5 million feet of timber in 1977. The second type of sales deleted was those that had no bidders. These sales were deleted to avoid counting them twice as many of these sales are readvertised and sold.

I deflated all cost and price data by the appropriate value of the wholesale price index--all commodities (1967=100) to offset the different rates of inflation in each quarter of the period covered by the data. Admittedly, deflating by the wholesale price index does not account for all the inflation or variability in prices or costs. Deflating does, however, make comparison of temporally distinct periods and aggregation over broad periods more compatible.

After deflation, the values reported in this study should be interpreted as the value expressed in 1967 dollars (the base year of the index). Further, changes between two points in time should be interpreted as a real change since inflationary increases have been factored out. The values could be converted to the original form by multiplying the value by the appropriate monthly wholesale price index (all commodities).

The period July 1974 through December 1977 is perhaps not typical of the post-World War II period in regard to price swings in forest product markets. More important, however, this period is not very different from the past decade. These words of caution should not be interpreted to mean that the study will lead to atypical results. Since the appraisal system follows the wholesale lumber price index, appraised price has moved up and down (as shown in figure 2) so that the effect on how bidders respond to sale characteristics is largely unaffected.

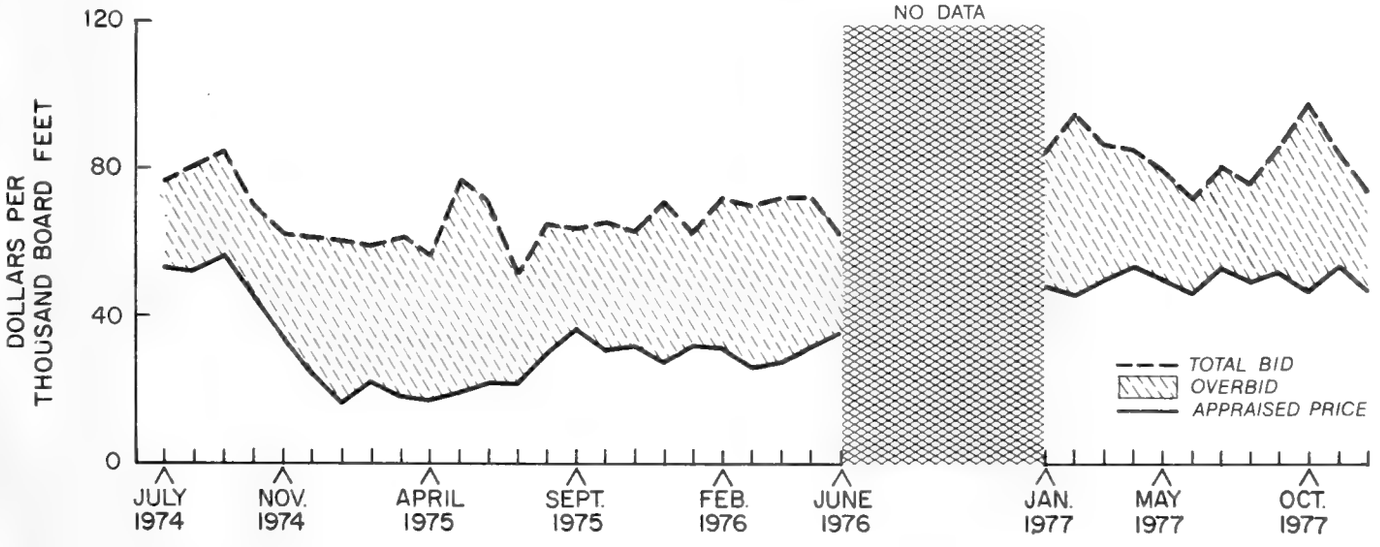


Figure 2.--Appraised price, overbid, and total bid in Region 6 zone 2.

ECONOMIC THEORY AND TIMBER MARKETS

Stumpage markets are frequently assumed to be competitive; that is, buyers and sellers interact to establish prices that reflect the underlying supply and demand forces. Mead (1966), however, has argued that markets for Federal timber are largely oligopolistic (characterized by a small number of participants) and may lead to markets that diverge from the competitive market model most frequently used by economists. Irland (1976), on the other hand, has argued that forest products markets are workably competitive with low buyer concentration, responsive competitive pricing, and an absence of supranormal profits.

A brief introduction to how markets for Federal timber compare with the competitive market model may help in understanding opposing viewpoints on the competitiveness of National Forest timber sales. Throughout this study, competitive stumpage markets are assumed. A competitive market model assumes that neither the buyer nor the seller can influence price through the sizes of their purchases or sales. The most important criterion for determining a competitive market has traditionally been multiplicity of traders (Stigler 1966), but the possibility that a number of traders might collude has led to other conditions. These conditions are perfect knowledge, product homogeneity, and product divisibility.

Both Mead (1966) and Irland (1976) recognize that the number of participants in Federal timber markets are limited by the spatial dispersion of timber resources and the forest products industry. In some areas, this may lead to stumpage markets that are divergent from the competitive norm. Domination by a single firm in a particular location, however, is offset by the heterogeneity of the firms bidding on the timber. These firms differ in size, product lines, and cost structures. Another factor that may tend to counteract one firm's dominating any particular market is the heterogeneous nature of timber sales. Many firms are equipped to handle certain species and grades, and there is little benefit in purchasing sales not having the species or grades needed.

On the other hand, some firms may pursue a preclusive bidding strategy to prevent certain firms from becoming established in an area. Since there are no restrictions (except those regarding log exports or the Set Aside Program) on subsequent sales of unwanted species and grades, a firm could buy a sale for which it has few or no plans for processing and sell the logs on the open market. In that way, one firm could control who gets the logs but not necessarily the price paid for the logs.

One might expect sellers of stumpage, in many areas only the USDA Forest Service, to exercise considerable power to deviate from the competitive norm. For practical purposes, the USDA Forest Service seems to exercise little market power, having diminished its potential strength through an appraisal system oriented toward fair market values, open bidding, and by offering a wide spectrum of timber sizes and quality.

The first of Stigler's (1966) additional conditions deals with the extent of available information, which in the case of National Forest timber sales is considerable. The USDA Forest Service makes available to each interested bidder a complete description of the sale, including the appraisal of the net stumpage price. In addition, the oral bidding methods used by the USDA Forest Service in the West allows for instantaneous adjustment in assessing how other firms value a particular sale. Although data exist showing how firms have bid in the past and data exist for uncut volumes under contract by each firm, few firms seem to make use of the information. Nevertheless, the competitive market model requires only the availability of relatively complete information and does not make any assumptions about how it is used by individual firms.

The second condition is product homogeneity, which in forestry is measured within species, log grades, and size classes and between different landowners. The USDA Forest Service generally sells the same species and grades of logs as are available from other sources. Forest products are characterized by a high level of product homogeneity as the bulk of forest industry output is concentrated in commodity grade items and sold under industrywide grading standards. Perhaps the only distinction some National Forest sales might enjoy is a higher volume of old growth, which might command a slight premium in some uses.

The concern about product divisibility (the third condition) complements the concern about product homogeneity. It is not enough to just have individual units that are highly substitutable for one another, but each unit must also be divisible. National Forest timber sales certainly meet this condition. Once sold, a timber sale consists of a number of logs, each of which can be either processed by the firm purchasing the sale or sold to other firms.

Another characteristic of timber markets that can influence competition is the suitability of various disposal policies for the market conditions encountered in forest products markets. Most National Forest timber is sold in open auctions by either oral or sealed bidding procedures. Oral auctions have both good and bad aspects from an economic standpoint. On the good side, they have the potential to lower the buyer's cost of preparing a bid since buyers can adjust bids as information is gained during the bidding process. The negative aspects largely involve the potential for collusive activity, which would lead to lower prices and misallocation of resources. Some economists assume that these negative aspects could be minimized by using sealed bidding rather than oral auctions. Sealed bidding has also been proposed as a deterrent to preclusive bidding (Mead 1967).

BACKGROUND INFORMATION ABOUT BIDDING

A factor that has probably influenced expectations about bidder behavior has been that most of the past empirical studies have dealt only with Region 6 zone 2, which appears to be generally atypical when compared with the other appraisal zones included in this study. This points out the need for caution in extrapolating the results discussed throughout this report to appraisal zones not covered in the report.

This section presents a discussion of a number of relationships describing how bidders might respond to variables, such as volume and other physical sale characteristics, costs, and administrative characteristics. In this study, these relationships were used to form expectations of how bidders might respond to changes in the USDA Forest Service timber sales program, such as the introduction of sealed bidding. Three relationships are discussed in this section: the mutual relationships between overbid and other sales characteristics, the effect of sale size on major sale characteristics, and the differences between competitive and noncompetitive sales.

The numerical results for analyses of the sale size and competitive and noncompetitive sales are given in appendix 1, tables 8-19.

The Measurement of Competition

In the introduction, overbid was assumed to provide a more rigorous measure of competition than bid-appraisal ratio for National Forest timber sales. The choice was based on how inflationary cost and price increases might affect the appraised price. The basic assumption was that there were no inflationary increases in overbid in the period covered by the data. In this section, the hypothesis that there were no real increases in overbid is tested for Region 6 zone 2. Since all data are deflated, we are concerned only with the relative real increases in the various variables. Region 6 zone 2 was chosen because of the large number of sales that take place throughout the year.

Monthly averages for Region 6 zone 2 were computed from the data for appraised price and overbid. Total bid was then computed as the sum of appraised stumpage and overbid. The test of the hypothesis required estimates of real increases over time. These increases were estimated by

fitting the various variables as a function of time and using a semi-logarithmic functional form. The coefficient on time was then interpreted as the monthly rate of real increases.[4/] The equations for appraised price, overbid, and total bid are shown in table 1.

Table 1--Estimated relationships between major sale variables and time

Variable	Equation coefficients[1/]		R^2	Monthly increase
	B_1	B_2		
				Percent
Appraised price	3.2408	+ 0.0155		
	(31.33)	(3.62)	0.28	1.562
Overbid	3.5517	- 0.0005		
	(46.67)	(0.165)	0	0
Total bid	4.1429	+ 0.0067		
	(105.21)	(4.09)	.33	.668

[1/] Numbers in parentheses are student t values.

[4/] The particular semilogarithmic form fitted was (for overbid (OB)):

$$\text{Log } OB = B_1 + B_2 \text{time}; \qquad (1)$$

where

log is the natural logarithm,
time is an index of months with July 1974=1,
B_1 is the intercept coefficient, and
B_2 is interpreted as $e^{(1+i)}$ where i is the monthly rate of increase.

Taking the antilog of B_2 (B_2'), we can solve the relationship:

$$B_2' = 1+i; \qquad (2)$$

$$i = B_2' - 1; \qquad (2a)$$

where i is the monthly rate of increase in overbid. This procedure is described in more detail in Johnston (1972).

The hypothesis was accepted that the coefficient on time in the equation for overbid was statistically insignificant; that is, based on the t statistic the estimated coefficient of B_2 is in all likelihood equal to zero. Equations were also estimated for appraised price and total bid, and the coefficients on time were statistically significant. Since the rate of increase in overbid remains unchanged, the rate of increase in total bid should be less than the rate of increase in appraised price. This contention is supported by the equations in table 1.

The lack of any consistent real price increases in overbid supports the assumption made in the introduction. The implication is that bidders did not change their real perceptions of the relationship between sale characteristics and overbid. Perhaps the rapid increases in appraised prices acted to retard changes in overbid. Regardless, bidders seem able to adjust total bid quickly to reflect real changes in costs and product prices.

Relationship Between Overbid and Other Sale Characteristics

Expectations about bidder response can be formed by computing the mutual relationships between overbid and various sale characteristics. One way to do this is to compute correlation coefficients. These measure the degree of closeness of the linear relationship between two variables. Correlation coefficients are pure numbers without units or dimensions and lie between -1 and +1. Positive values indicate a tendency of two variables to increase together, whereas negative values indicate that large values of one variable are associated with small values of the other variable.

In terms of how bidders respond, the most useful correlation coefficients are those between overbid and the various sale characteristics. These are shown in table 2. There are no standards that describe desirable levels for the correlation coefficients, nor is there any way to judge whether correlations between variables are real or not. Each field of investigation has its own range of coefficients. The highest coefficients, by far, are those for the relationship between overbid and number of bidders. In general, overbid declines on salvage sales, set-aside sales, or sales with a high appraised stumpage price. Overbid increases as sales become larger, have higher manufacturing costs (which is a proxy for species and log grades), and have a greater volume per acre. Correlation coefficients were computed between each possible pair of variables, and complete tables (by appraisal zone) are shown in appendix 2.

In addition to their usefulness in forming expectations, correlation coefficients play an important role in statistical analysis. The use of statistical techniques involving more than one explanatory variable assumes that these variables be independent; that is, no mutual relationship exists between explanatory variables. If independent variables are highly correlated, a loss of precision may result. In practice, this assumption is interpreted to mean high collinearity (correlation coefficients approaching one) should be avoided. Modest correlation between explanatory variables is usually ignored since it may be due to their common relation to a third variable.

Table 2--Correlation coefficients between overbid and major sale characteristics

Sale characteristics	Region 1 Zone 2	Region 5			Region 6	
		Zone 1	Zone 2	Zone 3	Zone 1	Zone 2
Volume per acre	-0.03	0.07	0.03	0.14	0.26	0.13
Salvage status	.03	-.07	-.02	-.14	-.26	-.12
Set-aside status	.04	-.07	-.02	-.14	-.26	-.13
Volume	0	.16	.22	.02	.08	.25
Major species	-.01	.05	-.19	-.14	-.03	.11
Appraised stumpage	.13	-.06	-.23	-.11	-.04	.08
Road costs	-.12	-.04	.18	.08	0	.13
Logging costs	-.16	-.06	-.09	.17	-.18	0
Manufacturing costs	.29	.16	.24	.38	-.11	.18
Number of bidders	.60	.67	.73	.63	.62	.47
Fiber	-.12	0	-.11	.28	0	-.10
Selling value	.14	-.02	-.15	.24	-.03	.22
Competitive status	.02	-.08	-.04	-.14	-.26	-.13
Termination period	.07	.12	.02	-.15	-.07	-.02

The Influence of Sale Size

Sale size as a proxy for sale profitability affects a number of sale characteristics, such as overbid, road costs, logging costs, number of bidders, and set-aside, salvage, or competitive status. I examined these relationships using the sale data for fiscal years 1975 and 1976 stratified into the seven sale-size classes shown in the tabulation:

Sale-size class	Volume (Thousand board feet)
1	0- 500
2	500- 1,000
3	1,000- 2,000
4	2,000- 5,000
5	5,000- 8,000
6	8,000-15,000
7	15,000+

Smaller sales were more closely stratified because the relationship between sale size and most sale characteristics has traditionally been assumed to be hyperbolic. Results for the six appraisal zones are shown in tables 14-19 in appendix 1.

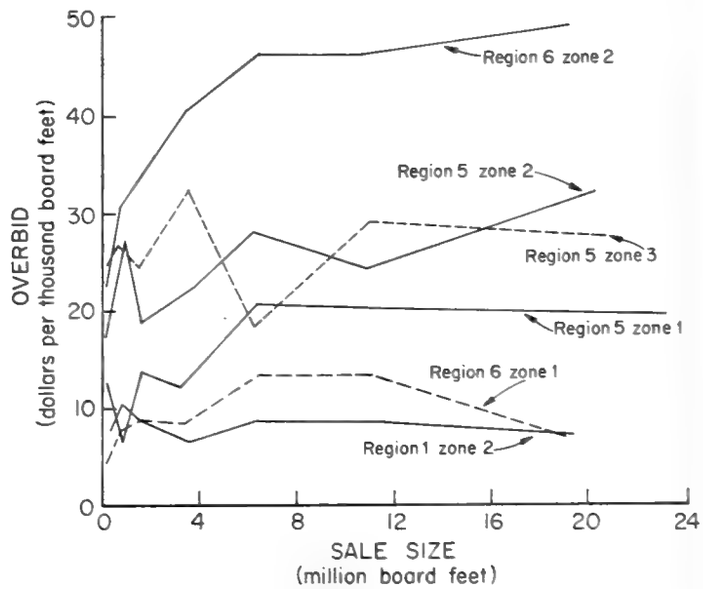
Overbid is often assumed to vary directly with sale size but at a diminishing rate. The actual relationship (for fiscal year 1975-76 data) is shown in figure 3 for the six appraisal zones. The prior statement fits Region 6 zone 2 best. For the remaining areas, overbid seems highly erratic on smaller sales. On sales over 5 million board feet, overbid seems relatively insensitive to sale size.

Road costs, like overbid, are frequently assumed to vary directly with sale size; the fiscal year 1975-76 data support this contention. In nearly all zones, road costs per thousand board feet increase rapidly as sale size increases until sale size exceeds 2 million board feet. Then the relationship between sale size and road costs is nearly flat. Region 6 zone 1 is the exception. There the relationship is roughly linear throughout the range of sale sizes.

Road costs have also been suggested as having a depressing influence on the bid price (Ho 1963). Ho's suggestion was tested for Region 6 zone 2 using the fiscal year 1975-76 data stratified by sale size. If his suggestion is correct, then sales with low road costs should have higher overbids than sales with higher road costs.

Each sale size stratum was divided into a low and a high road cost group. The average road cost per thousand board feet for each stratum was used as the criterion for division. The average road costs per thousand

Figure 3.--Relationship of overbid and sale size.



board feet for each group and the average overbid for each group are shown in table 3. A t-test was used to compare the average overbids for each group; in general, road costs appear to have only an erratic effect on overbids. The second sale-size class is the only one in which road costs may depress overbids. If the differences in sale size are ignored, then in some zones high road costs may deter bidding in that noncompetitive sales have higher road costs.

Table 3--Data for testing the effect of road costs on overbid

Sale-size class	Average road costs	Low road costs		High road costs	
		Costs	Overbid	Costs	Overbid
		Dollars per thousand board feet			
1	0.89	0	22.03	11.84	28.78
2	1.88	.04	33.84	7.93	18.24
3	3.22	.31	33.81	11.44	29.90
4	7.51	1.95	39.57	15.97	41.93
5	10.35	5.08	48.04	18.49	42.97
6	11.13	5.24	45.19	19.70	47.99
7	10.40	5.72	50.74	17.49	45.63

Logging costs are often assumed to vary inversely with sale size in that smaller sales are expected to have high logging costs because of the initial setup costs. This is true, however, only in Region 6. In other Regions, logging costs generally increase as sales become larger and may reflect different logging systems on larger sales.

Most people have assumed that the intensity of bidding for timber sales increases as sale sizes get larger. When number of bidders qualifying to bid is used as a proxy for the intensity of bidding, this assumption is true. The increase in the number of bidders from the smallest to the largest sale-size class ranges from 30 percent in Region 6 zone 1 to 164 percent in Region 6 zone 2. This increase in number of bidders is reflected in the higher overbids on larger sales as these two sale characteristics vary directly with each other.

Three variables indicate how the sale will be administered. The first indicator is whether the sale is for salvage or not. As might be expected, salvage sales are concentrated in the smaller sizes and, to some extent, depress overbid and bidder participation. The second indicator is the percent that are Small Business Administration set-aside sales. Conceptually,

this program offers typical sales to qualified firms.[5/] In most of the six zones studied, set-aside sales were concentrated in the 2- to 8-million-board-foot-sale size classes. In Region 6 zone 2, the program was concentrated in the 5- to 8-million-board-foot-sale class. The third indicator is competition; it will be discussed in more detail in the next section.

Competitive and Noncompetitive Sales

In terms of published studies, Mead (1966) was the first to make a practical distinction between competitive and noncompetitive sales. This latter class of sales included both one-bidder and token bid sales. Mead (1966) initially attributed noncompetitive sales to either implicit or explicit collusive practices; in a later article (1967), he proposed that industry characteristics--such as fixed investments, immobile resources, size and heterogeneity of sales, and dependency on specific resources--would lead to conditions conducive to noncompetitive sales.

The emphasis in this section is on determining the characteristics of a noncompetitive sale. This assumes that noncompetitive sales somehow differ in either physical or administrative characteristics in such a way that prospective bidders evaluate those sales as being less desirable. The possibility that bidders might collude is addressed in a later section.

Each sale was classified as either competitive or noncompetitive by the criteria discussed in the section, "Definitions and Available Data." What type of sales are noncompetitive? The answer to the question varies by the relative competitiveness of each zone. In zones characterized by a relatively low degree of competition (Region 1 zone 2 and Region 6 zone 1), there is little difference in sale size between competitive and noncompetitive sales; but the noncompetitive sales are inferior in most other aspects. That is, volume per acre and selling values are lower, but road and logging costs are higher on noncompetitive sales. In Region 5 (characterized by moderate competition), noncompetitive sales are slightly smaller than competitive sales, but the appraised stumpage price is higher on noncompetitive sales. The differences in costs and sale quality characteristics is mixed, making it difficult to judge why the sales are perceived by bidders as undesirable and suggesting that perhaps other, unmeasured factors influence the bidders. In Region 6 zone 2 (characterized by intense competition), noncompetitive sales are much smaller and less attractive in that they have lower volumes per acre, higher incidence of salvage sales, and higher logging costs. Complete results are given in tables 8-13, appendix 1.

[5/] Forest Service Manual 2431.17--2. U.S. Department of Agriculture, Washington D.C.

RECENT SALES-RELATED ISSUES

The focus of the remainder of this report is the empirical examination of recent sale-related issues. These issues are the impact of sealed bidding, the type of sales being offered as set-aside sales, and the opportunity for monitoring sales. Each of the three major controversies will be examined independently. All analyses use the common data base described in the section, "Definitions and Available Data," and all results from the various analyses are presented in appendix 1. Throughout this section, a great deal of reliance is placed on forming expectations, such as those discussed in the previous section. The policy implications evolving from these controversies are discussed in the last section.

The Sealed Bid Issue

During the past two decades, National Forest timber sales have used either oral or sealed bidding procedures, depending on local preferences. The rule of local preferences was changed suddenly in the fall of 1976 when a last-minute addition to the National Forest Management Act (U.S. Laws, Statutes, etc. 1976) required the use of "sealed bidding on all sales except where the Secretary [of Agriculture] determines otherwise by regulations." This mandate was a reaction to the potential for collusion on oral bidding for National Forest timber.

Proponents of oral bidding responded by arguing that sealed bidding threatened many western communities dependent on Federal timber. Senator Packwood's description of the problem posed by universal use of sealed bidding was typical. He said (Congressional Record, p. S 17278, 9/30/76):

> In many areas of Oregon there is only one lumbermill in a town. The town depends upon the mill for employment. When the mill owner knows that he is going to be short of timber, he will go out and bid to the sky, if necessary, to keep that mill going. And so long as the bidding is open, he knows how high he has to go. But when the bids are sealed, that owner may put in what he regards as a very high bid, but if for some reason somebody bids higher, that owner does not get the timber and the mill shuts down.
>
> What you end up with is a mill out of timber and a town out of jobs solely because sealed bids rather than open bids are used.

Proponents of sealed bidding cited the strong indications of collusive practices in areas in which oral auctions have been the predominant bidding method. In addition, they claimed that Government income would likely increase if sealed bidding were required.

The debate led to congressional action in 1978, amending the National Forest Management Act to return to historical bidding methods (U.S. Laws, Statutes, etc. 1978). Key arguments of the proponents of oral bidding were community stability and the impact of nonlocal bidders.

The impact of sealed bidding on stumpage prices was an integral part of the issue over bidding practices. For example, in areas where the markets are competitive, sealed bidding was seen as having little effect on prices. Sealed bidding, however, was proposed as a means of increasing competition and prices in areas where little competition existed.

The preceding discussion introduces several questions involving sealed bidding as it affects the competition for timber:

1. Did the method of bidding influence timber prices in areas characterized by competition or by little competition?
2. Did the mix of sealed and open bidding methods in 1977 result in higher prices than those observed prior to the switch to sealed bidding?
3. Did the use of sealed bidding during 1977 lead to a higher incidence of nonlocal bidders?

The following sections present analyses of each of these questions.

THE INFLUENCE OF BIDDING METHOD ON BID PRICES

During 1977 the USDA Forest Service offered both oral and sealed bid sales. The proportions of each method varied from Forest to Forest, depending on the regulations governing the implementation of sealed bidding.[6/] The two groups of sales (oral and sealed bid) were treated as two independent samples, and the differences in the means of various sale characteristics were tested (using a *t*-test) for significance.

One question which generated considerable interest was the impact of sealed bidding on stumpage prices represented here as overbid. The impact was hypothesized to differ between competitive and noncompetitive areas.

In competitive areas, no difference in overbid was expected between bidding methods. In noncompetitive areas, a significant difference was expected between bidding methods. The results, in general, did not support the hypotheses. Region 6 zone 2 was the only Region in which sealed bidding resulted in a significant difference in overbid, and this was contrary to what was expected since this zone is competitive. The differences in overbid per thousand board feet are shown in the tabulation:

[6/] These regulations were given in the Federal Register (1977).

Region	Appraisal zone		
	1	2	3
	(Dollars)		
1	--	2.01	--
5	-15.40	11.79	-25.23
6	.82	7.64	--

The minus signs indicate that, on the average, overbids on oral auction sales were higher than on sealed bids. Complete results are given in tables 20-25, appendix 1.

The incongruous nature of these results can be better understood by examining the differences in sale size between oral and sealed bids. The differences are shown in the tabulation:

Region	Zone		
	1	2	3
	(Thousand board feet)		
1	--	-3,568	--
5	-8,133	-1,928	-10,628
6	-1,631	-918	--

In every zone, oral sales are larger on the average than those offered under sealed bidding. This suggests that differences in sale size may distort comparisons of overbid for sealed bid vs. oral auction sales.

To improve the sensitivity of the analysis, I stratified the data by sale size into three groups: 0-2, 2-8, and 8+ million board feet. This is roughly the same procedure Johnson used when he split sales into two groups based on road costs (see footnote 1). He argued that sealed bidding would produce higher prices on sales where the bidders had different cost structures. Sales with higher road costs would attract larger and more efficient bidders who could afford to pay more for a sale. In this analysis, sealed bidding is expected to have a greater impact on larger sales since road costs vary directly with sale size.

When we consider the effects of sale size and testing, the two sealed bid hypotheses lead to the results shown in table 4. Complete results are given in tables 26-42, appendix 1. Sealed bidding resulted in higher overbids on sales between 2 million and 8 million board feet in both zones characterized by little competition. This is the most common sale size, and the results for Region 1 zone 2 support Johnson's finding for the same area (see footnote 1). In addition, sealed bidding led to higher overbids on the smallest and largest sales in Region 6 zone 2. These results were not expected in Region 6 zone 2 and suggest that if the degree of competition for each Region had been assigned by sale size, the resulting classification would have been different for the smaller sales in Region 6 zone 2. Elsewhere, sealed bidding led to higher overbids, but the results were not statistically significant.

Table 4--Differences in overbid per thousand board feet by sale size[1/]

Region	Zone 1, by sale size			Zone 2, by sale size			Zone 3, by sale size		
	1	2	3	1	2	3	1	2	3
1				+1.11	+5.76	+5.03			
5	+2.45	-16.38	+6.88	-4.69	+29.58	+33.39	--	-16.85	+3.47
6	-2.03	+8.67	-1.44	+12.70	+2.27	+9.33			

[1/]The plus sign or minus sign signifies whether the overbid on sealed bid sales was greater than or less than the overbid on oral bid sales. Sale size 1 is 0-2 million board feet; sale size 2 is 2-8 million board feet; sale size 3 is 8+ million board feet.

HISTORICAL BIDDING PATTERNS VERSUS A MIX OF ORAL AND SEALED BIDDING METHODS

The USDA Forest Service did not universally adopt sealed bidding but rather implemented a mix of bidding methods in 1977, raising the question of whether the mix of bidding methods led to higher overbids. This question is formalized in the following hypothesis. The mix of bidding methods used in 1977 resulted in higher overbids than the mix of bidding methods prevalent before the congressional action--U.S. Laws, Statutes, etc. (1976).

The hypothesis was tested by determining if the introduction of a large number of sealed bids caused a shift in the relationship between overbid and sale characteristics and between overbid and bidder behavior. That relationship can be expressed as

$$y = c_1 + c_2 Z + c_3 B; \qquad (3)$$

where

y is the overbid,
Z is the sale characteristics,[7/]
B is the number of bidders, and
C_i is the coefficient for the i^{th} variable.

The estimation of this relationship is complicated by seemingly erratic movements in forest product prices and costs even though they have been deflated by the wholesale price index. Figure 2 illustrates how the overbid for Region 6 zone 2 varied during the 3-year period included in this study. A monthly time trend was added to the model to further explain the shift in prices over time. This time trend is a sequential index of the month and year that the sale occurred.

A technique developed by Chow (1960) and later described by Johnston (1972) was used to test the hypothesis that the 1977 mix of bidding methods resulted in higher overbids than the mix of bidding methods prevalent before. Essentially, the test involves fitting a regression to the observations in the first period (fiscal years 1975 and 1976) and then pooling the data from the first period with the data from the second period (calendar year 1977) and estimating a second regression relationship from the combined data set. The test statistic is then a ratio of the residual sum of squares[8/] from the two estimated relationships. Test results for the six appraisal zones are shown in appendix 3; they led to the rejection of the hypothesis that the relationship between overbid and both sale and bidder characteristics shifted between the base period and calendar year 1977.

THE OUTSIDER QUESTION

The introduction of sealed bidding threatened to limit the effectiveness of established firms in an area controlling access of new or outside firms (those whose processing facilities are located outside the local community) to localized timber markets. Thus, the arguments against sealed bidding revolved around the probable impact of outside bidders and were often stated in conjunction with concerns about community stability. The scenario often described was that outside bidders could materially affect a community which was dependent on the local forest products industry for employment if that industry was dependent on public timber as a raw material source.

[7/] Includes both physical and cost characteristics listed on page 5.

[8/] In this case, the residual sum of squares measures the portion of the overall dispersion of observed overbids not explained by the estimated lines of regression.

Opponents of sealed bidding argued that outsiders are more of a problem under sealed bidding. All 19 National Forests in Region 6 were surveyed to investigate this possibility. The survey covered the base period (fiscal years 1975 and 1976) when oral auctions were the prevalent sales method and the first 9 months of 1977 when sealed bidding was common. Each bidder on each sale was classified as either an expected bidder or an unexpected bidder (an outsider); whether the primary manufacturing facilities of each bidder were located within the adjacent dependent community was also determined.[9/]

The outsider data base was used to test the hypothesis that the incidence of outside bidders remained either unchanged between the two periods or the mean of the second period was less than the first. The alternative hypothesis was that the incidence of outsiders was higher in the second period (characterized by sealed bidding). The analysis was conducted by computing for each Forest and for each time period the average number of outsiders on each sale.

Across the Region, sealed bidding did not lead to a higher incidence of outsiders, as the regionwide average of 0.4 outsider on each sale was roughly the same in the base period and in 1977. As might be expected, this regionwide average varies widely between individual Forests and may be related more to timber supply than sale method. Forests in Region 6 zone 1 generally have a higher incidence of outsiders than the Forests in Region 6 zone 2 (table 5).

A *t* test was used on the hypothesis concerning differences between the average number of outside bidders in each period for each Forest and appraisal zone. The hypothesis was rejected only in Region 6 zone 2 where the average number of outsiders on each sale increased from 0.29 to 0.35. The first hypothesis was not rejected in Region 6 zone 1 or in the Region as a whole. For individual Forests, there were significant differences in seven Forests. Of the seven, three Forests (Wenatchee, Mount Baker-Snoqualmie and Gifford Pinchot) experienced a decline between the base period and 1977. This decline was inconsistent with the general expectation that sealed bidding leads to greater opportunities for outsiders. Three Forests in southwest Oregon experienced an increase in outsiders as did the Ochoco National Forest in zone 1.

[9/] Federal Register (1977) definition: "'Adjacent dependent community' means an area with common social and economic interests bounded by established daily marketing and workforce connecting patterns, and encompassing one or more primary wood product manufacturing facilities located within or adjacent to a specific area of National Forest timber upon which it is dependent for its timber supply and where 10 percent or more of the community workforce is employed in the primary manufacture of wood products, including logging and log transportation, and National Forest timber accounted for at least 30 percent of the timber used in the primary wood product manufacturing facilities in the last 5 calendar years."

Table 5--Average number of outsiders bidding on sales in Region 6

National Forest and zone	1975-76[1]		1977[2]	
	Average	Standard deviation	Average	Standard deviation
Deschutes	0.653	1.958	0.576	0.902
Fremont	1.070	.961	.615	.506
Malheur	.047	.213	.083	.280
Ochoco	.231	.583	.667	.492
Okanogan	.571	.870	.417	.793
Umatilla	1.172	1.037	1.020	1.005
Wallowa-Whitman	.064	.247	.091	.292
Wenatchee	.638	.965	.143	.359
Winema	.326	.845	.333	.485
Colville	.333	.479	.267	.704
Region 6 zone 1	.510	1.055	.421	.381
Gifford Pinchot	.296	.683	.093	.336
Mount Baker-Snoqualmie	.199	.493	.087	.284
Mount Hood	.313	.590	.219	.417
Olympic	.457	.919	.222	.548
Rogue River	.301	.652	.681	1.163
Siskiyou	.447	.701	.557	.723
Siuslaw	.549	.886	.842	.960
Umpqua	.040	.195	.482	.817
Willamette	--	--	--	--
Region 6 zone 2	.291	.563	.354	.380
Region 6	.406	.709	.389	.616

[1]Oral bidding was the predominant sale method.

[2]Sealed bidding and oral bidding were both used.

In southern Oregon, as well as other areas, some outsiders were actually firms located within the adjacent dependent community but they had not bid previously on sales in the area.

The impact of outsiders is commonly thought of as increasing bid prices as local bidders attempt to prevent entry of outsiders into an area or as the outside bidder pays an excessive premium to gain entry. The impact of outsiders on bid prices can be examined by combining the outsider data base with the sale data used in the other analyses and then testing the hypothesis that the presence of outsiders led to more intense bidding and higher overbids.

The results for Region 6 zones 1 and 2 are given in appendix 1, tables 43 and 44. The hypothesis was accepted in both zones as the presence of outsiders led to a greater number of bidders and higher overbids ($7.39 per thousand board feet greater in zone 1 and $8.37 per thousand board feet greater in zone 2). The difference in overbids raises the question that possible differences in the physical characteristics of the sales themselves might have accounted for the different overbids. In zone 1, the sales that attracted outsiders were on the average nearly 1 million feet larger than those attracting only expected bidders. Other than that distinction, there was no difference between sales attracting outside bidders and sales attracting only expected bidders. In both zones, set-aside sales attracted a higher number of outside bidders than did open sales.

The SBA Issue

The SBA Set-Aside Program is designed to provide opportunities for small forest product firms to remain viable. The purpose of the program is to help insure that a predetermined share of National Forest timber harvest is available to qualified small forest products firms. To qualify, firms must be primarily engaged in logging or the manufacture of forest products, must be independently owned and operated, must not dominate in their field of operation, and must not employ more than 500 employees (see footnote 5).

Briefly, the intent of the Small Business Set-Aside Program is to "aid, counsel, assist, and protect insofar as possible the interests of small business concerns in order to preserve free competitive enterprise." (U.S. Laws, Statutes, etc. 1958). The program is activated when small business firms are unable to purchase a predetermined percentage of the volume offered. This percentage is based on buying patterns over a 5-year period. For example, the current average small business share of the sawtimber volume offered in Washington and Oregon is 51 percent.[10/]

If small business firms do not purchase their share of sales during a 12-month period and the accumulated deficit is greater than 10 percent of the small business share for the period, a set-aside program is triggered for the following 12 months. During the first 6 months of this subsequent period, sales containing enough total volume to equal approximately half the accumulated deficit plus the small business share for the period are offered as set-aside sales restricted to qualified small business firms. During the second 6-month period, any remaining deficit volume plus the small business

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[10/] In the two States, the SBA share is computed for 34 market areas and ranges from 6 to 92 percent.

share are offered as set-aside sales. These sales may be purchased by large firms only if the USDA Forest Service receives no bids from qualified small firms and if the sale is readvertised.

A concern involving the USDA Forest Service timber sale program has been whether large and small bidders are being treated equitably by the Small Business Set-Aside Program; that is, during the period covered by the data, did the characteristics of sales offered as set-aside roughly equal those offered for open bidding and were bid prices equal. In this section National Forest sale data were used in examining these concerns for the six appraisal zones.

Regulations (see footnote 5) provide two guidelines for the selection of set-aside sales. First, consideration should be given to the type of material needed by small businesses and the capability of the small businesses to operate the sales. Second, sales in the Set-Aside Program should be typical of sales currently offered on the Forest. In practice, the sale selection process may focus more on providing material suitable for small firms than on insuring that the two classes of sales are similar. For example, the USDA Forest Service has been reluctant to designate as set-aside sales either sales involving helicopter yarding or salvage sales containing large amounts of chippable material. In the latter case, few small firms can utilize the material as it is best suited to the manufacture of pulp and paper and these facilities are invariably only available in large businesses.

Three aspects of the sale selection process can be expressed as hypotheses suitable for statistical analysis of National Forest sales data. These hypotheses are:

1. No difference exists between the characteristics of set-aside and open sales.
2. Logging costs are less on set-aside sales than on open sales.
3. The volume of chippable material is less on set-aside sales than on open sales.

The test of the first hypothesis indicates whether the characteristics of set-aside sales are typical of open sales. The tests of the next two hypotheses indicate the extent to which the Set-Aside Program takes into account the capabilities of small businesses to operate sales and to use the material on each sale.

The second issue deals with bid prices. One would expect that if the characteristics of the two types of sales are similar, there would be no difference in the bid prices or number of bidders. This led to a fourth hypothesis: No difference exists between the overbids of set-aside and open sales.

Testing the hypotheses involved collecting similar data for each sale. A combination of all sale characteristics (listed in appendix 1, tables 45-50) was used to test the first hypothesis. A single variable was used to test the second, third, and fourth hypotheses. Logging costs were chosen for the second hypothesis as these costs vary, depending on the required logging techniques. The assumption is that less expensive techniques would be encountered more frequently on sales purchased by small firms. The third hypothesis was tested only in Region 6 zone 2; the percentage of total volume classified as PAM (per acre material) was used as the measure of chippable volume. The fourth hypothesis used high bid minus appraisal stumpage and road costs as a measure of bid prices.

The first hypothesis was tested by comparing the linear combination of corresponding characteristics between open sales and set-aside sales. The values for competitive status, number of bidders, and bid price are only for information and were not used in testing the hypothesis. In all Regions, except Region 5 zone 3, the null hypothesis was rejected because the linear combination of means differed between the two types of sales. Discriminant analysis was used as a multivariate generalization of the t test to test the first hypothesis. Details are given in appendix 4.

The second, third, and fourth hypotheses were tested by pooling the variance of the characteristic under consideration for both set-aside and open sales. The means were then compared with a student's t test for the two types of sales. A summary of the differences in means is given in table 6. The second hypothesis stated that logging costs are less on set-aside sales than on open sales, and the analysis indicated that a statistical difference does exist in both zones in Region 6. In other zones, logging costs on set-aside sales were roughly the same as on open sales. For Region 6 zone 2, the third hypothesis that the volume of PAM material on set-aside sales was less was rejected. Although on the average there was slightly less PAM on set-aside sales (0.53 percent), this difference was not statistically significant.

The fourth hypothesis stated that no difference exists between the overbids of the two types of sales. The differences in overbids are shown in table 6. The hypothesis was rejected (at the 5-percent level of significance) only in Region 6 zones 1 and 2. In Region 6 zone 1, set-aside sales had significantly larger overbids than did open sales. In Region 6 zone 2, set-aside sales had significantly lower overbids than did open sales; these results were unexpected since set-aside sales there are significantly larger and would be judged as having higher potential profitability. This was also true, but to a lesser extent, in Region 1 zone 2 and Region 5 zone 2.

Table 6--Differences in means between set-aside and open sales[1/]

Region	Zone	Sale size	Overbid	Logging cost	Road costs
		Thousand board feet	Dollars per thousand board feet		Dollars
1	2	291	[2/]-2.89	0.86	[3/]3.44
5	1	401	5.07	.48	[3/]4.68
	2	2,670	[2/]-7.97	-4.70	[3/]2.94
	3	[2/]3,028	1.83	-.43	3.42
6	1	472	[3/]3.68	[2/]-2.06	[3/]1.54
	2	[3/]1,539	[3/]-5.78	[3/]-1.79	[3/]2.55

[1/]A minus sign denotes higher value on open sales than on set-aside sales.

[2/]Significant at the 90-percent level.

[3/]Significant at the 95-percent level.

This analysis was extended by separating the open sales purchased by small firms from open sales purchased by large firms and making two comparisons. The first comparison was whether small firms and large firms pay the same overbid for National Forest timber. The second comparison was whether there was a difference in overbid between set-aside sales and open sales purchased by small firms. The results for each of the three groups by appraisal zone are given in tables 51-56 in appendix 1.

These comparisons were made by analysis of variance techniques. A linear combination of the group means was formed for each comparison, each mean multiplied by a number (see Snedecor and Cochran (1967) for details). In the first comparison the numbers were 0.5, 0.5, and -1, respectively. These numbers were interpreted as comparing the average of the two groups of sales purchased by small firms with the group of sales purchased by large firms (the numbers must sum to zero). In the second comparison, the numbers were 1, -1, and 0. Zero was used for the third group since it was not involved in the comparison. The results are shown in table 7. The first comparison (between overbid paid by large and small firms) shows that small firms paid a smaller overbid than did large firms. The exceptions were in Region 5 zone 1 and Region 6 zone 1, where small firms tended to pay more although the differences were not statistically significant. In the other appraisal zones (except Region 5 zone 3), small firms pay significantly less than large firms. That difference should be not unexpected as the sales purchased by small firms are, on the average, 2.23 million board feet smaller in all zones than sales purchased by large firms.

Table 7--Comparisons of overbid between small and large firms and between set-aside sales and open sales purchased by small firms[1/]

Region	Zone	First comparison			Second comparison		
		L[2/]	SE[3/]	t[4/]	L[2/]	SE[3/]	t[4/]
1	2	-2.34	1.13	2.07	2.09	1.73	1.21
5	1	4.29	3.01	1.43	3.35	5.00	.67
	2	-11.45	3.92	2.92	.79	5.62	.14
	3	-6.25	4.16	1.50	7.95	6.56	1.21
6	1	1.47	1.43	1.03	4.06	2.10	1.93
	2	-8.05	1.77	4.55	2.36	2.28	1.04

[1/]The plus or minus sign signifies whether the overbid on set-aside sales was greater than or less than the overbid on open sales.

[2/]Linear combination of means ($\bar{x}_i$) computed as

$$L = \sum_{i=1}^{k} \lambda_i \bar{x}_i;$$

where: λ_i are fixed numbers 0.5, 0.5, and -1 in the 1st comparison and 1, -1, and 0 in the 2d comparison.
k is the number of groups.

[3/]Standard error computed as

$$SE = \sqrt{\text{within mean square} * \sum_{i=1}^{k} \frac{\lambda_i^2}{n_i}};$$

where n_1 is the sample size.

[4/]Student's t ratio values in excess of 1.96 are significant; i.e., the difference in means is 95 percent certain.

The second comparison was between set-aside sales and open sales purchased by small firms. All appraisal zones shared the same results. There was no difference in the overbids between the two types of sales. These results are unexpected given the differences between the characteristics of the two types of sales. Open sales purchased by small firms are smaller in every appraisal zone, except Region 5 zone 1, than either

set-aside sales or open sales purchased by large firms. They also contain the highest proportion of salvage sales. These attributes should have resulted in lower overbids for open sales than for set aside sales. The finding of no difference in overbids supports the contention put forth in the set-aside open sale analysis that overbids on set-aside sales are generally less than might be expected.

The Sale Monitoring Issue

The possibility of collusion among bidders has been of concern to some government agencies, as well as to members of Congress. The key point is how to determine whether sales that were noncompetitive might have been so because of collusive practices.

This section outlines one approach for identifying suspicious sales; that is, sales in which collusion is suspected. The approach involves separating the noncompetitive sales into two groups. The first group includes sales that prospective bidders would generally evaluate as undesirable because of low potential profitability. Little competition would be expected on these sales. The second group contains sales that have many of the attributes of competitive sales but, nevertheless, when sold, were noncompetitive. This latter group could be further studied for suspicious bidding patterns.

The first step in implementing this approach is to classify each sale as competitive or noncompetitive by the definition discussed in the section, "Definitions and Available Data." Details on how discriminant analysis is used to classify sales and the discriminant functions estimated for each appraisal zone are given in appendix 5.

The concern in sale monitoring is with sales that were a priori classified as noncompetitive. These sales are reclassified, and two groups emerge. First, there are sales for which the subsequent classification is the same as the a priori classification. These sales, for my purposes, are sales that appear to have a low potential profitability to prospective bidders. It is the second group that is of interest--it contains sales for which subsequent reclassification was different from the a priori classification. These latter sales were reclassified as competitive because they are physically similar to competitive sales. From the viewpoint of sale monitoring, these latter sales should be examined for patterns in bidding. For example, if several sales on a district are initially classified as noncompetitive but subsequently are reclassified as competitive and if the same bidders are involved, those sales should be examined for any mitigating circumstances that might account for what appeared to be collusion.

This approach was applied to the data for fiscal years 1975 and 1976. The power of the approach was greatly diminished by use of discriminant functions estimated for each appraisal zone rather than estimating functions on a more specific scale. Nevertheless, the possibilities of the approach can be explored through an example.

The example was identified by reclassifying the noncompetitive sales to determine if any had the characteristics of competitive sales. Several potential examples emerged, and the following was selected: All four initially classified noncompetitive sales within one district in Region 5 were reclassified as competitive. Only one of the five sales offered in the district had been competitive in the 2 years covered by the data and that sale comprised only 1 percent of the volume sold. Closer examination revealed that the same four bidders always bid on the noncompetitive sales but did not bid on the one competitive sale that took place during the period.

The example illustrates the ability of discriminant analysis to separate suspicious bidding patterns from the larger set of noncompetitive sales. The analysis in this study indicated that most noncompetitive sales are such because they appear to bidders to have low potential profitability. The example used here illustrates a bidding pattern that might involve collusive practices. On the other hand, this bidding pattern may have arisen out of chance, or mitigating circumstances may explain it.

Summary

In this section, 10 hypotheses were tested for related timber sale issues. No hypotheses were tested for sale monitoring--the third sales-related issue. An example was used instead to illustrate how sales could be monitored.

The 10 hypotheses are summarized on the following page:

Hypothesis	Comments
In competitive areas there is no difference in overbid, between oral and sealed bidding methods, but in noncompetitive areas there is a significant difference.	Results did not support the hypothesis.
The first hypothesis was repeated for three sale sizes (0-2, 2-8, and 8+ million board feet).	Sealed bidding led to higher overbids on sales between 2 and 8 million board feet in areas characterized by little competition.
The mix of bidding methods used in 1977 resulted in higher overbids than the mix of bidding methods used in the 1975-76 period.	Results did not support the hypothesis.
Incidence of outside bidders remained unchanged over the 3-year period (Tested only in Region 6).	Regionwide, the data supported the hypothesis. The incidence of outsiders, however, has increased in Region 6 zone 2.
Where the incidence of outsiders has changed it was higher under sealed bidding (Tested only in Region 6).	The incidence of outsiders was higher in Region 6 zone 2.
The presence of outside bidders on a sale leads to higher overbids (Tested only in Region 6).	Overbids in both zones of Region 6 were higher on sales where outsiders participated.
No difference exists between characteristics of set-aside and open sales.	The hypothesis was rejected.
Logging costs are less on set-aside sales.	The hypothesis was accepted only in Region 6.
Volume of chippable material is less on set-aside sales (Tested only in Region 6).	The hypothesis was rejected.
No difference exists between the overbids of set-aside and open sales.	The hypothesis was accepted only in Region 5 zones 1 and 3. In Region 6 zone 2, Region 1 zone 1, and Region 5 zone 2, overbids on set-aside sales were significantly less than the overbids on open sales. In Region 6 zone 1, overbids were higher on set-aside sales than on open sales.

POLICY IMPLICATIONS

The empirical analysis of sale characteristics for the three issues illustrates that the impact of various sales-oriented programs is highly variable when actually applied. Given this variation, there is little reason to expect that sales offered as either oral or sealed, open or set-aside would be of roughly equal size and potential profitability and have the same bid price.

Given the physical differences in sales, the salient policy question is whether bid prices match expectations based on sale size and profitability. Lower prices for sales of at least equal profitability is symptomatic of either restricted competition or a lack of competition. This may be the case in some areas for the Set-Aside Program which limits participation to small firms.[11/] In the case of sealed bidding, the USDA Forest Service may have inadvertently limited the effectiveness of sealed bidding in increasing competition and bid prices by the regulations governing its use. For example, in some areas, oral auction sales tended to be of better quality than sealed bid sales.

Sealed Bidding

In general, sealed bidding did not lead to uniformly higher bid prices. There may be reasons for this conclusion, however, that are not readily apparent. For example, sealed bid sales are generally smaller than oral auction sales. This difference is influenced by USDA Forest Service regulations, which require oral bidding on any sale that, by its size, comprises more than 20 percent of the sale programs for a particular Forest. The use of oral bidding during 1977 was particularly prevalent in Region 5, which historically has had larger sales than either Region 1 or Region 6. Selling value (the single best indicator of quality) is generally lower on sealed bid sales, indicating that these sales may be of lower quality and hence should have lower prices.

Another example of regulations influencing the effect of sealed bidding in raising prices is the case of outsiders. Regulations dictate that if an outsider buys a sale, oral bidding will be used for the next 6 months. This regulation was used in Region 6 zone 1 on several Forests in 1977.

In spite of the limitations imposed by regulations, the use of sealed bidding enhanced competition for National Forest timber in the two areas (Region 1 zone 2 and Region 6 zone 1) that have historically experienced relatively limited competition. In areas where competition is strong, sealed bidding had little impact except on smaller sales in Region 6 zone 2 where sealed bidding led to higher prices.

The mix of oral and sealed bidding implemented in 1977 had little impact on overbid compared with preceding years. One reason for this was the regulations designed to minimize the impact of potential log flow shifts on timber-dependent communities. The use of sealed bidding did lead to a higher incidence of outsiders in southwestern Oregon.

[11/] This is not the same as limiting the number of bidders. Set-aside sales, in fact, generally attract a greater number of bidders than open sales do.

The Set-Aside Program

The lower prices in some appraisal zones associated with set-aside sales suggest that the Federal Government is making an implicit payment to firms winning set-aside sales. In other zones, prices for set-aside sales are higher than open sales, representing an implicit payment to the Government. The magnitude of these payments can be estimated by comparing the overbids on the two types of sales after adjusting for differences in sale size.

This adjustment involves estimating a linear function, linking overbid to sale size, and then predicting the overbids associated with each size sale. The difference in predicted overbid between set-aside and open sales was used to adjust the observed difference between the two types of sales. In Region 6 zone 2, for example, the overbid on open sales is $5.78 per thousand board feet higher than the overbid on set-aside sales, but set-aside sales average 1.539 million board feet larger. The adjustment for the difference in sale size is $2.84 per thousand board feet, increasing the difference in overbid to $8.62 per thousand board feet. This same procedure was repeated for all appraisal zones, although in some zones the difference in sale sizes was subtracted rather than added because overbid declined as sales grew larger. The adjusted overbids are shown in the following tabulation. A minus sign indicates that overbids on set-aside sales are less than on open sales.

	Zone		
Region	1	2	3
1	--	-3.11	--
5	5.05	-5.66	1.95
6	2.98	-8.62	--

The Government's net implicit payment to small firms can be estimated by aggregating these differences weighted by sale volumes. The total net implicit payment for the 2-year period and for all zones was $13.036 million ($15.610-$2.574) to purchasers of set-aside sales.

The actual implicit payment varies widely on a finer geographic scale. For example, the implicit payment on the three National Forests in southwest Oregon (Umpqua, Rogue River, and Siskiyou) was $15.73 per thousand board feet (Haynes 1979). In this area, the total implicit payment for the 2-year period was slightly more than $10.5 million and was shared by 35 firms. The implicit payment was not shared equally, as seven firms accounted for 52 percent of the set-aside sales.

In Region 5 zones 1 and 3 and in Region 6 zone 1, purchasers of set-aside sales paid more than if the sales had been sold as open sales. This illustrates the intense bidding that many people feel characterizes set-aside sales. This type of bidding may result from frustrations, as suggested by Mead (1966), from differences in sale characteristics between set-aside and open sales, or from potential purchasers' differing perceptions of markets and production alternatives. It is also possible that small firms compete more vigorously on set-aside sales than on open sales in deference to the large firms with whom they have contractual arrangements for selling chips.

The differences in overbid between set-aside sales and open sales raises the larger issue of possible differences between the prices paid for National Forest timber by large and small firms. In general, small firms pay less for National Forest timber in all areas except Region 5 zone 1 and Region 6 zone 1. This is consistent with the observed differences in sale characteristics, particularly size. Sales purchased by small firms are smaller in every zone and, for all six zones, average 2.23 million board feet smaller.

Sale Monitoring

During the 1975-76 period there was little indication of widespread collusive activity. Examination of noncompetitive bidding patterns revealed only a few cases that might warrant investigation. Most noncompetitive sales are so classified because potential bidders probably perceive them as undesirable.

The same techniques used for sale monitoring could also be used to identify sales that have a low probability of being sold as competitive. If these sales were identified before they were offered, in some cases, the sale characteristics might be altered, so as to increase the probability of the sale being sold competitively and, hence, increasing the returns to the U.S. Treasury.

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APPENDIX 1. ANALYTICAL RESULTS FOR EACH APPRAISAL ZONE

Summary results are presented in this appendix for the various analyses carried out during this study. The results are summarized for each appraisal zone. Briefly, these results are:

Tables 8-13	Results for the noncompetitive-competitive sale analysis
Tables 14-19	Results for the sale size analysis
Tables 20-25	Results for the oral-sealed bid analysis
Tables 26-42	Results for the oral-sealed bid (by sale size) analysis
Tables 43-44	Results for the outsider analysis
Tables 45-50	Results for the set-aside-open analysis
Tables 51-56	Results for the set-aside and small open and large open analysis

For all analyses except the sale size analysis and the analysis of set-aside and small open and large open sales, the summary results consisted of sample means ($\bar{x}$) and deviations (s) for each group (i), as well as the pooled deviation (sp) and the $\underline{t}$ statistic for comparing the sample means.

The estimate of pooled variance was computed as:

$$s_p^2 = \sum_{i=1}^{k} s_i^2 (n_i-1) / \sum_{i=1}^{k} n_i - k; \tag{4}$$

where k is the number of groups and n_i is the sample size of group i. The pooled standard error was computed as:

$$s_p = \sqrt{s_p^2 \frac{(n_1+n_2)}{n_1 n_2}} \quad . \tag{5}$$

The $\underline{t}$ test with n_1+n_2-2 degrees of freedom was:

$$\underline{t} = (x_1 - x_2)/s_p. \tag{6}$$

When the number of groups was more than two, the summary results consisted of sample means, within mean squares (pooled variance), between mean squares, and an F statistic. A one-way analysis of variance was used to test the hypothesis that the sample means were equal. The between mean squares were computed as follows:

$$\text{Between mean squares} = \left(\sum_{j=1}^{k} (\bar{x}_j n_j)^2 / n_j - \left(\sum_{j=1}^{k} \bar{x}_j n_j\right)^2 / \sum_{j=1}^{k} n_j\right)/k-1. \tag{7}$$

The F statistic is then computed as the ratio of between mean squares and within mean squares with k-1 and $\sum_{j=1}^{k} n_j - k$ degrees of freedom.

TABLE 8--RESULTS FOR NONCOMPETITIVE AND COMPETITIVE ANALYSIS, REGION 1 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS NONCOMP	COMP	SAMPLE DEVIATIONS NONCOMP	COMP	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	6.59	7.17	4.49	6.50	.77	-.76
SALVAGE STATUS	1.83	1.71	.37	.46	.06	2.28
SET-ASIDE STATUS	1.80	1.89	.40	.32	.04	-2.01
SALES VOLUME (MMBF)	5.98	4.62	5.64	5.38	.70	1.96
MAJOR SPECIES (PERCENT)	18.53	14.42	19.35	16.93	2.25	1.83
APPRAISED STUMPAGE ($/MBF)	5.37	13.85	7.92	13.27	1.54	-5.50
OVERBID ($/MBF)	0.00	11.06	0.00	9.56	1.04	-10.59
ROAD COSTS ($/MBF)	11.22	6.99	9.97	7.67	1.07	3.98
HAUL DISTANCE (MILES)	29.70	33.79	14.97	24.82	2.89	-1.42
LOGGING COST ($/MBF)	47.24	43.33	11.05	8.81	1.21	3.23
MANUFACTURING COSTS ($/MBF)	47.62	49.48	5.82	6.97	.85	-2.18
NUMBER OF BIDDERS	1.77	3.33	1.11	1.95	.23	-6.89
FIBER (PERCENT)	5.35	5.72	15.65	18.19	2.24	-.16
SELLING VALUE ($/MBF)	106.56	120.95	20.10	21.57	2.70	-5.32
TERMINATION PERIOD (YEARS)	3.55	2.85	1.87	1.87	.24	2.94

NOTES

1. NUMBER OF OBSERVATIONS ARE 84 AND 228, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 310 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9667.

TABLE 9--RESULTS FOR NONCOMPETITIVE AND COMPETITIVE ANALYSIS, REGION 5 ZONE 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS NONCOMP	COMP	SAMPLE DEVIATIONS NONCOMP	COMP	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	10.71	7.85	12.46	6.57	1.46	1.96
SALVAGE STATUS	1.94	1.86	.24	.35	.06	1.31
SET-ASIDE STATUS	2.00	1.89	0.00	.31	.05	2.01
SALES VOLUME (MMBF)	7.57	9.11	10.17	8.55	1.65	-.93
MAJOR SPECIES (PERCENT)	11.06	8.05	23.24	14.17	2.98	1.01
APPRAISED STUMPAGE ($/MBF)	18.41	15.31	19.28	14.65	2.90	1.07
OVERBID ($/MBF)	0.00	19.62	0.00	18.96	3.26	-6.02
ROAD COSTS ($/MBF)	9.38	7.95	10.31	8.19	1.60	.90
HAUL DISTANCE (MILES)	31.97	31.59	13.72	16.86	3.07	.12
LOGGING COST ($/MBF)	32.06	32.50	11.65	8.92	1.76	-.26
MANUFACTURING COSTS ($/MBF)	38.07	37.93	6.28	6.58	1.22	.12
NUMBER OF BIDDERS	1.97	4.57	1.14	2.42	.42	-6.13
FIBER (PERCENT)	0.00	.58	0.00	4.73	.81	-.72
SELLING VALUE ($/MBF)	103.84	102.71	18.04	18.99	3.53	.32
TERMINATION PERIOD (YEARS)	3.18	3.78	2.46	2.15	.41	-1.45

NOTES

1. NUMBER OF OBSERVATIONS ARE 34 AND 178, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 210 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9704.

TABLE 10--RESULTS FOR NONCOMPETITIVE AND COMPETITIVE ANALYSIS, REGION 5 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS NONCOMP	COMP	SAMPLE DEVIATIONS NONCOMP	COMP	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	5.19	4.58	3.87	5.01	1.64	.37
SALVAGE STATUS	1.80	1.73	.42	.45	.15	.49
SET-ASIDE STATUS	1.90	1.77	.32	.42	.14	.92
SALES VOLUME (MMBF)	5.45	7.18	9.43	7.64	2.61	-.66
MAJOR SPECIES (PERCENT)	14.00	10.54	27.41	20.57	7.11	.49
APPRAISED STUMPAGE ($/MBF)	30.01	16.00	27.71	14.40	5.38	2.60
OVERBID ($/MBF)	0.00	26.71	0.00	19.24	6.11	-4.37
ROAD COSTS ($/MBF)	1.87	5.25	2.59	6.05	1.94	-1.74
HAUL DISTANCE (MILES)	44.10	45.65	20.83	53.01	16.98	-.09
LOGGING COST ($/MBF)	36.27	38.37	16.73	11.97	4.17	-.50
MANUFACTURING COSTS ($/MBF)	37.84	40.43	5.89	6.08	2.02	-1.28
NUMBER OF BIDDERS	1.90	5.24	1.60	2.57	.83	-4.01
FIBER (PERCENT)	0.00	1.21	0.00	10.66	3.39	-.36
SELLING VALUE ($/MBF)	114.50	110.69	21.87	17.85	6.09	.62
TERMINATION PERIOD (YEARS)	2.10	2.97	2.42	2.09	.71	-1.22

NOTES

1. NUMBER OF OBSERVATIONS ARE 10 AND 88, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 96 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9839.

TABLE 11--RESULTS FOR NONCOMPETITIVE AND COMPETITIVE ANALYSIS, REGION 5 ZONE 3

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS NONCOMP	COMP	SAMPLE DEVIATIONS NONCOMP	COMP	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	13.90	8.41	17.38	11.22	2.97	1.85
SALVAGE STATUS	1.84	1.63	.37	.48	.12	1.80
SET-ASIDE STATUS	1.95	1.89	.23	.32	.08	.79
SALES VOLUME (MMBF)	3.92	5.97	7.84	6.80	1.75	-1.21
MAJOR SPECIES (PERCENT)	26.31	24.61	28.01	24.47	6.11	.28
APPRAISED STUMPAGE ($/MBF)	23.58	14.16	20.12	13.11	3.46	2.72
OVERBID ($/MBF)	0.00	29.75	0.00	22.74	5.23	-5.69
ROAD COSTS ($/MBF)	5.83	6.82	10.37	7.66	1.97	-.50
HAUL DISTANCE (MILES)	36.89	35.92	27.70	30.73	7.45	.13
LOGGING COST ($/MBF)	35.31	37.15	12.49	15.91	3.81	-.48
MANUFACTURING COSTS ($/MBF)	34.38	40.60	10.02	14.91	3.53	-1.76
NUMBER OF BIDDERS	2.16	5.69	1.80	2.70	.64	-5.51
FIBER (PERCENT)	0.00	1.71	0.00	10.98	2.53	-.67
SELLING VALUE ($/MBF)	107.78	108.82	25.83	34.94	8.33	-.12
TERMINATION PERIOD (YEARS)	1.89	2.84	2.05	2.11	.52	-1.82

NOTES

1. NUMBER OF OBSERVATIONS ARE 19 AND 134, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 151 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9748.

TABLE 12--RESULTS FOR NONCOMPETITIVE AND COMPETITIVE ANALYSIS, REGION 6 ZONE 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS NONCOMP	COMP	SAMPLE DEVIATIONS NONCOMP	COMP	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	5.77	7.36	5.93	7.90	.68	-2.35
SALVAGE STATUS	1.76	1.79	.43	.41	.04	-.79
SET-ASIDE STATUS	1.89	1.77	.32	.42	.04	3.15
SALES VOLUME (MMBF)	5.91	6.10	6.37	5.29	.55	-.33
MAJOR SPECIES (PERCENT)	47.74	46.57	36.77	37.86	3.56	.33
APPRAISED STUMPAGE ($/MBF)	15.96	17.31	16.04	15.87	1.52	-.89
OVERBID ($/MBF)	.01	17.12	.02	16.30	1.16	-14.69
ROAD COSTS ($/MBF)	5.25	5.31	6.27	5.84	.57	-.10
HAUL DISTANCE (MILES)	33.77	35.03	14.35	17.21	1.52	-.83
LOGGING COST ($/MBF)	35.24	32.70	9.61	8.16	.84	3.03
MANUFACTURING COSTS ($/MBF)	49.26	50.51	9.11	9.58	.89	-1.40
NUMBER OF BIDDERS	1.84	4.10	1.07	2.08	.16	-13.89
FIBER (PERCENT)	4.13	4.41	14.01	10.16	1.14	-.24
SELLING VALUE ($/MBF)	115.76	117.58	21.03	19.94	1.94	-.94
TERMINATION PERIOD (YEARS)	3.29	3.53	1.82	1.75	.17	-1.43

NOTES

1. NUMBER OF OBSERVATIONS ARE 196 AND 253, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 447 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9643.

TABLE 13--RESULTS FOR NONCOMPETITIVE AND COMPETITIVE ANALYSIS, REGION 6 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS NONCOMP	COMP	SAMPLE DEVIATIONS NONCOMP	COMP	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	16.64	23.02	17.88	20.59	2.37	-2.69
SALVAGE STATUS	1.53	1.67	.50	.48	.06	-2.41
SET-ASIDE STATUS	1.89	1.78	.32	.42	.05	2.22
SALES VOLUME (MMBF)	2.00	4.76	4.00	5.29	.61	-4.56
MAJOR SPECIES (PERCENT)	57.18	54.40	40.07	28.24	3.37	.82
APPRAISED STUMPAGE ($/MBF)	32.40	31.44	25.28	19.70	2.33	.41
OVERBID ($/MBF)	0.00	38.67	0.00	30.54	3.44	-11.25
ROAD COSTS ($/MBF)	3.42	6.12	8.37	8.02	.93	-2.89
HAUL DISTANCE (MILES)	35.77	39.41	18.95	17.14	2.00	-1.82
LOGGING COST ($/MBF)	45.30	39.10	18.51	11.78	1.43	4.35
MANUFACTURING COSTS ($/MBF)	50.58	55.71	12.78	10.27	1.21	-4.24
NUMBER OF BIDDERS	1.66	6.86	1.83	3.14	.35	-14.74
FIBER (PERCENT)	12.39	13.11	22.14	13.35	1.63	-.45
SELLING VALUE ($/MBF)	145.17	146.59	31.00	25.00	2.95	-1.16
TERMINATION PERIOD (YEARS)	1.56	3.01	1.62	1.74	.20	-7.26

NOTES

1. NUMBER OF OBSERVATIONS ARE 79 AND 1240, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 1317 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9608.

TABLE 14--RESULTS FOR SALE SIZE ANALYSIS, REGION 1 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS 0-.5MMBF	.5-1MMBF	1-2MMBF	2-5MMBF	5-8MMBF	8-15MMBF	15MMBF+	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	5.15	3.78	8.20	7.39	8.40	8.44	9.02	149.61	34.05	4.39
SALVAGE STATUS	1.57	1.35	1.78	1.84	1.83	1.89	2.00	1.70	.16	10.45
SET-ASIDE STATUS	1.94	1.90	1.94	1.71	1.79	1.93	1.86	.43	.11	3.78
SALES VOLUME (MMBF)	.42	.78	1.62	3.52	6.49	11.52	18.92	1443.31	2.17	665.66
MAJOR SPECIES (PERCENT)	14.52	16.78	14.44	19.50	16.70	12.53	10.55	357.54	311.63	1.15
APPRAISED STUMPAGE ($/MBF)	19.60	19.55	8.97	10.07	5.70	5.37	7.40	1788.12	127.49	14.03
OVERBID ($/MBF)	7.72	10.17	8.63	6.53	8.80	8.72	7.12	61.60	91.50	.67
ROAD COSTS ($/MBF)	.93	3.62	4.38	11.92	12.67	13.55	11.75	1383.82	47.25	29.29
HAUL DISTANCE (MILES)	27.56	31.77	30.03	33.29	33.25	42.00	32.71	1014.69	502.80	2.02
LOGGING COST ($/MBF)	40.52	44.50	45.17	45.46	46.79	45.90	44.28	258.30	89.01	2.90
MANUFACTURING COSTS ($/MBF)	48.49	49.15	49.31	48.26	50.44	49.27	48.08	29.53	45.51	.65
NUMBER OF BIDDERS	2.32	2.55	2.88	3.08	3.27	3.33	3.29	8.05	3.51	2.30
FIBER (PERCENT)	6.25	3.20	10.40	4.11	3.39	9.24	1.57	376.14	305.70	1.23
SELLING VALUE ($/MBF)	121.62	127.76	110.45	118.02	113.17	110.79	115.34	1510.55	468.19	3.23
COMPETITIVE STATUS	1.78	1.87	1.84	1.67	1.65	1.69	1.67	.32	.19	1.67
TERMINATION PERIOD (YEARS)	1.03	1.52	1.88	3.35	4.33	4.89	6.05	139.51	.90	154.41

NOTES

1. NUMBER OF OBSERVATIONS ARE 72, 31, 32, 63, 48, 45, AND 21, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 6 AND 305 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.1527.

TABLE 15--RESULTS FOR SALE SIZE ANALYSIS, REGION 5 ZONE 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS 0-.5MMBF	.5-1MMBF	1-2MMBF	2-5MMBF	5-8MMBF	8-15MMBF	15MMBF+	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	7.05	7.79	6.94	6.83	9.03	8.34	10.50	61.48	61.55	1.00
SALVAGE STATUS	1.58	1.60	1.83	1.89	2.00	2.00	2.00	1.06	.08	12.61
SET-ASIDE STATUS	1.97	1.93	2.00	1.86	1.86	1.85	1.95	.11	.08	1.37
SALES VOLUME (MMBF)	.28	.83	1.52	3.24	6.43	10.92	23.24	2459.04	8.07	304.53
MAJOR SPECIES (PERCENT)	11.29	4.33	1.68	10.45	11.21	9.82	5.35	318.06	252.37	1.26
APPRAISED STUMPAGE ($/MBF)	28.79	22.88	16.23	9.71	13.94	10.73	13.05	1667.35	197.67	8.43
OVERBID ($/MBF)	12.30	6.90	13.73	12.10	20.81	20.52	19.84	739.88	342.25	2.16
ROAD COSTS ($/MBF)	0.00	2.77	1.81	9.19	8.54	13.09	11.98	905.87	48.80	18.56
HAUL DISTANCE (MILES)	30.11	28.27	35.25	35.57	30.14	31.13	32.02	152.82	271.32	.56
LOGGING COST ($/MBF)	30.21	34.50	31.18	34.78	34.80	34.30	29.07	204.72	84.60	2.42
MANUFACTURING COSTS ($/MBF)	33.77	36.46	38.18	39.45	39.43	39.67	38.24	161.60	39.01	4.14
NUMBER OF BIDDERS	2.08	2.27	3.17	4.11	4.67	5.26	5.30	59.60	4.47	13.34
FIBER (PERCENT)	0.00	3.33	0.00	.76	0.00	0.00	.74	26.01	18.56	1.40
SELLING VALUE ($/MBF)	103.73	107.87	97.05	101.98	104.33	103.51	101.13	170.39	358.81	.47
COMPETITIVE STATUS	1.71	1.73	1.92	1.93	1.95	1.83	1.86	.23	.13	1.75
TERMINATION PERIOD (YEARS)	.55	1.33	1.92	3.32	4.05	5.04	6.05	140.61	.89	157.91

NOTES

1. NUMBER OF OBSERVATIONS ARE 38, 15, 12, 28, 21, 54, AND 44, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 6 AND 205 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.1764.

TABLE 16--RESULTS FOR SALE SIZE ANALYSIS, REGION 5 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS 0-.5MMBF	.5-1MMBF	1-2MMBF	2-5MMBF	5-8MMBF	8-15MMBF	15MMBF+	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	1.46	1.46	2.17	5.47	7.79	5.09	8.64	120.64	17.51	6.89
SALVAGE STATUS	1.38	1.14	1.58	2.00	2.00	2.00	1.89	1.39	.11	12.33
SET-ASIDE STATUS	1.95	1.86	1.92	1.71	2.00	1.40	1.79	.57	.15	3.94
SALES VOLUME (MMBF)	.27	.94	1.59	3.88	6.16	10.82	20.21	861.88	7.27	118.61
MAJOR SPECIES (PERCENT)	9.21	.03	12.66	8.43	8.81	12.44	17.36	313.64	456.77	.69
APPRAISED STUMPAGE ($/MBF)	23.26	20.92	17.86	13.18	5.68	16.11	18.61	342.85	267.48	1.28
OVERBID ($/MBF)	17.28	27.53	18.82	22.99	28.30	24.32	32.39	458.61	395.36	1.16
ROAD COSTS ($/MBF)	0.00	.30	2.35	7.39	5.72	11.40	5.98	240.98	20.81	11.58
HAUL DISTANCE (MILES)	38.81	52.00	33.08	48.18	49.43	72.07	33.47	2759.90	2597.55	1.06
LOGGING COST ($/MBF)	33.89	40.42	41.60	42.67	48.02	35.02	34.66	322.02	144.20	2.23
MANUFACTURING COSTS ($/MBF)	37.61	42.09	39.70	41.63	40.26	39.41	41.81	41.52	36.74	1.13
NUMBER OF BIDDERS	3.62	4.14	3.75	5.12	4.29	5.53	6.84	22.02	6.08	3.62
FIBER (PERCENT)	0.00	0.00	8.84	0.00	0.00	0.00	0.00	136.81	102.03	1.34
SELLING VALUE ($/MBF)	105.57	116.14	111.21	115.27	109.78	112.62	110.72	183.89	339.74	.54
COMPETITIVE STATUS	1.81	1.86	1.83	1.94	2.00	2.00	1.89	.08	.09	.86
TERMINATION PERIOD (YEARS)	.43	.86	1.42	2.88	3.43	4.93	5.42	59.39	.78	76.55

NOTES

1. NUMBER OF OBSERVATIONS ARE 19, 7, 12, 17, 7, 15, AND 19, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 6 AND 89 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.2705.

TABLE 17--RESULTS FOR SALE SIZE ANALYSIS, REGION 5 ZONE 3

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS 0-.5MMBF	.5-1MMBF	1-2MMBF	2-5MMBF	5-8MMBF	8-15MMBF	15MMBF+	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	11.15	13.08	6.55	7.63	6.31	7.71	7.24	129.04	150.08	.86
SALVAGE STATUS	1.29	1.36	1.38	1.94	2.00	2.00	2.00	2.94	.11	25.68
SET-ASIDE STATUS	1.96	1.93	2.00	1.94	1.71	1.83	1.88	.18	.09	2.03
SALES VOLUME (MMBF)	.25	.72	1.62	3.65	6.36	10.99	20.77	1128.69	3.81	296.04
MAJOR SPECIES (PERCENT)	19.88	22.80	20.71	23.83	27.25	32.12	29.56	584.80	618.53	.95
APPRAISED STUMPAGE ($/MBF)	23.77	18.48	13.62	11.97	6.98	9.57	9.05	1144.13	169.71	6.74
OVERBID ($/MBF)	24.29	26.66	24.77	32.30	18.67	29.23	27.69	344.65	557.84	.62
ROAD COSTS ($/MBF)	.23	1.30	2.80	10.78	12.17	13.58	11.67	878.80	30.78	28.55
HAUL DISTANCE (MILES)	32.71	34.57	27.12	52.44	29.94	38.14	38.71	1070.82	910.88	1.18
LOGGING COST ($/MBF)	35.27	34.19	34.04	39.51	42.53	35.54	39.93	193.15	242.24	.80
MANUFACTURING COSTS ($/MBF)	37.36	36.72	41.83	40.94	39.56	42.38	44.01	168.08	212.37	.79
NUMBER OF BIDDERS	4.23	5.36	5.25	6.19	5.29	5.90	6.24	16.15	7.81	2.07
FIBER (PERCENT)	4.39	0.00	0.00	0.00	0.00	0.00	0.00	110.47	105.64	1.05
SELLING VALUE ($/MBF)	107.12	100.41	102.86	112.11	109.93	110.83	114.96	395.58	1178.37	.34
COMPETITIVE STATUS	1.77	2.00	2.00	1.88	1.82	1.97	1.94	.21	.11	2.03
TERMINATION PERIOD (YEARS)	.54	1.29	1.63	3.13	4.29	4.90	5.41	98.53	.64	153.46

NOTES

1. NUMBER OF OBSERVATIONS ARE 52, 14, 8, 16, 17, 29, AND 17, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 6 AND 146 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.2056.

TABLE 18--RESULTS FOR SALE SIZE
ANALYSIS, REGION 6 ZONE 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS 0-.5MMBF	.5-1MMBF	1-2MMBF	2-5MMBF	5-8MMBF	8-15MMBF	15MMBF+	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	4.52	2.33	4.44	7.42	7.78	9.14	7.31	346.85	47.00	7.38
SALVAGE STATUS	1.36	1.29	1.54	1.87	1.98	2.00	2.00	5.53	.10	53.46
SET-ASIDE STATUS	1.92	1.87	1.83	1.80	1.82	1.74	1.89	.25	.14	1.70
SALES VOLUME (MMBF)	.29	.74	1.61	3.37	6.46	11.04	19.23	2293.11	2.76	832.29
MAJOR SPECIES (PERCENT)	46.25	59.68	45.56	35.50	43.14	48.93	68.29	6568.31	1325.03	4.96
APPRAISED STUMPAGE ($/MBF)	17.42	21.90	13.57	17.15	18.01	14.27	16.53	404.37	252.05	1.60
OVERBID ($/MBF)	4.50	7.60	8.69	8.60	13.22	13.48	7.36	702.84	215.21	3.27
ROAD COSTS ($/MBF)	.05	.54	2.83	4.87	8.86	8.08	9.08	819.52	25.63	31.98
HAUL DISTANCE (MILES)	32.32	36.33	32.56	33.69	33.46	35.58	38.76	254.32	256.67	.99
LOGGING COST ($/MBF)	36.15	33.41	32.86	33.60	33.56	34.16	32.32	74.37	79.34	.94
MANUFACTURING COSTS ($/MBF)	48.16	50.27	50.18	49.22	49.32	51.28	51.58	88.81	38.15	1.01
NUMBER OF BIDDERS	2.32	2.33	3.00	3.27	3.54	3.54	3.03	15.65	4.04	3.87
FIBER (PERCENT)	6.40	3.27	9.25	4.64	2.41	2.22	3.90	354.95	140.66	2.52
SELLING VALUE ($/MBF)	114.99	119.59	110.53	115.34	119.64	117.39	121.29	658.54	413.83	1.59
COMPETITIVE STATUS	1.49	1.51	1.58	1.55	1.60	1.65	1.45	.31	.25	1.24
TERMINATION PERIOD (YEARS)	1.00	1.60	1.98	3.20	4.46	5.08	5.39	175.58	.84	208.37

NOTES

1. NUMBER OF OBSERVATIONS ARE 53, 45, 48, 102, 65, 98, AND 38, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 6 AND 442 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.1377.

TABLE 19--RESULTS FOR SALE SIZE
ANALYSIS, REGION 6 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS 0-.5MMBF	.5-1MMBF	1-2MMBF	2-5MMBF	5-8MMBF	8-15MMBF	15MMBF+	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	14.84	14.24	16.31	24.37	28.59	32.77	36.79	13126.48	361.54	36.31
SALVAGE STATUS	1.32	1.45	1.45	1.77	1.97	1.96	1.97	15.90	.15	104.08
SET-ASIDE STATUS	1.90	1.89	1.75	1.75	1.67	1.73	1.76	1.60	.16	9.98
SALES VOLUME (MMBF)	.23	.73	1.45	3.45	6.46	10.72	19.23	5629.70	2.08	2711.83
MAJOR SPECIES (PERCENT)	55.10	54.27	56.06	52.64	54.82	57.29	48.78	883.92	841.76	1.05
APPRAISED STUMPAGE ($/MBF)	36.33	34.76	30.85	30.05	27.99	29.20	26.96	2352.09	393.06	5.98
OVERBID ($/MBF)	22.54	30.20	32.79	40.51	46.05	46.11	49.34	19918.44	873.46	22.80
ROAD COSTS ($/MBF)	.89	1.88	3.22	7.51	10.35	11.13	10.43	3788.05	47.98	78.94
HAUL DISTANCE (MILES)	38.29	38.84	40.06	39.23	39.51	39.31	41.68	140.36	297.12	.47
LOGGING COST ($/MBF)	43.46	42.18	39.61	39.28	37.50	35.78	34.33	1912.11	142.73	13.40
MANUFACTURING COSTS ($/MBF)	53.96	56.34	55.99	55.17	56.22	56.45	55.48	196.91	105.42	1.87
NUMBER OF BIDDERS	3.60	5.71	6.48	7.35	7.92	8.44	9.46	770.90	7.25	106.40
FIBER (PERCENT)	12.13	13.98	16.36	12.70	12.32	11.69	15.60	514.78	195.20	2.64
SELLING VALUE ($/MBF)	151.41	151.88	145.67	147.81	148.21	148.14	141.31	1563.09	607.94	2.57
COMPETITIVE STATUS	1.82	1.97	1.98	1.98	1.98	1.96	1.99	.97	.05	18.54
TERMINATION PERIOD (YEARS)	1.11	1.64	2.03	3.06	4.35	4.86	5.59	508.66	.78	648.26

NOTES

1. NUMBER OF OBSERVATIONS ARE 305, 150, 157, 237, 183, 214, AND 71, RESPECTIVELY.
2. TO CONVEPT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 6 AND 1310 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.1155.

TABLE 20--RESULTS FOR ORAL AND SEALED BID ANALYSIS, REGION 1 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	8.14	5.81	7.10	6.93	1.00	2.33
SALVAGE STATUS	1.71	1.57	.46	.50	.07	2.03
SET-ASIDE STATUS	1.97	1.90	.17	.30	.04	1.70
SALES VOLUME (MMBF)	6.18	2.61	7.62	4.10	.71	5.00
MAJOR SPECIES (PERCENT)	12.55	17.59	14.36	20.24	2.71	-1.85
APPRAISED STUMPAGE ($/MBF)	19.08	23.04	15.75	16.27	2.31	-1.72
OVERBID ($/MBF)	7.25	9.26	9.63	8.98	1.31	-1.54
ROAD COSTS ($/MBF)	9.91	4.72	11.81	8.67	1.37	3.80
HAUL DISTANCE (MILES)	34.14	31.87	18.15	18.39	2.62	.86
LOGGING COST ($/MBF)	49.24	47.76	9.52	11.57	1.59	.93
MANUFACTURING COSTS ($/MBF)	53.80	53.96	10.93	9.15	1.38	-.11
NUMBER OF BIDDERS	2.23	2.51	1.07	1.57	.21	-1.31
FIBER (PERCENT)	10.36	8.59	26.18	25.12	3.63	.49
SELLING VALUE ($/MBF)	146.39	144.66	24.45	22.27	3.27	.53
COMPETITIVE STATUS	1.74	1.88	.44	.32	.05	-2.83
TERMINATION PERIOD (YEARS)	3.28	1.90	1.90	1.68	.25	5.52

NOTES

1. NUMBER OF OBSERVATIONS ARE 65 AND 196, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 259 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9682.

TABLE 21--RESULTS FOR ORAL AND SEALED BID ANALYSIS, REGION 5 ZONE 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	6.15	6.13	4.82	8.40	1.18	.02
SALVAGE STATUS	1.67	1.41	.47	.49	.08	3.37
SET-ASIDE STATUS	1.91	1.91	.28	.29	.05	.09
SALES VOLUME (MMBF)	10.27	2.14	9.61	4.43	1.01	8.02
MAJOR SPECIES (PERCENT)	7.20	4.82	12.28	12.24	1.93	1.23
APPRAISED STUMPAGE ($/MBF)	24.65	24.58	14.61	14.19	2.25	.03
OVERBID ($/MBF)	33.63	18.23	28.61	17.32	3.36	4.58
ROAD COSTS ($/MBF)	9.10	2.36	7.43	6.21	1.04	6.49
HAUL DISTANCE (MILES)	35.03	34.30	14.10	13.70	2.17	.34
LOGGING COST ($/MBF)	41.04	40.36	10.23	12.20	1.83	.37
MANUFACTURING COSTS ($/MBF)	42.98	31.08	6.38	18.73	2.52	4.72
NUMBER OF BIDDERS	3.95	2.88	1.88	2.00	.31	3.45
FIBER (PERCENT)	0.00	3.56	0.00	12.65	1.66	-2.14
SELLING VALUE ($/MBF)	131.05	109.85	16.67	31.90	4.44	4.78
COMPETITIVE STATUS	1.96	1.80	.31	.40	.06	1.68
TERMINATION PERIOD (YEARS)	3.91	1.24	2.50	1.59	.30	8.89

NOTES

1. NUMBER OF OBSERVATIONS ARE 58 AND 133, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 189 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9717.

TABLE 22--RESULTS FOR ORAL AND SEALED BID ANALYSIS, REGION 5 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	3.44	6.59	2.53	8.77	1.79	-1.76
SALVAGE STATUS	1.19	1.71	.40	.46	.12	-4.43
SET-ASIDE STATUS	1.77	1.71	.43	.46	.12	.45
SALES VOLUME (MMBF)	8.05	6.13	5.86	6.39	1.67	1.15
MAJOR SPECIES (PERCENT)	3.63	8.13	6.28	15.73	3.31	-1.36
APPRAISED STUMPAGE ($/MBF)	25.51	27.34	14.63	17.31	4.38	-.42
OVERBID ($/MBF)	19.33	31.12	18.65	25.19	6.07	-1.94
ROAD COSTS ($/MBF)	5.99	5.87	4.80	7.49	1.73	.07
HAUL DISTANCE (MILES)	53.35	40.32	25.89	15.41	5.75	2.27
LOGGING COST ($/MBF)	42.63	36.59	8.72	7.50	2.21	2.73
MANUFACTURING COSTS ($/MBF)	42.11	44.12	6.33	12.09	2.66	-.76
NUMBER OF BIDDERS	4.69	4.46	2.88	3.01	.80	.28
SELLING VALUE ($/MBF)	130.37	126.27	18.11	23.76	5.78	.71
COMPETITIVE STATUS	1.81	1.89	.40	.31	.10	-.87
TERMINATION PERIOD (YEARS)	2.12	2.00	1.53	2.07	.50	.23

NOTES

1. NUMBER OF OBSERVATIONS ARE 26 AND 28, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 52 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.0051.

TABLE 23--RESULTS FOR ORAL AND SEALED BID ANALYSIS, REGION 5 ZONE 3

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	8.41	9.30	5.29	12.25	3.35	-.26
SALVAGE STATUS	1.93	1.41	.27	.50	.14	3.76
SET-ASIDE STATUS	1.79	1.60	.43	.49	.14	1.31
SALES VOLUME (MMBF)	12.81	2.18	9.29	4.07	1.54	6.90
MAJOR SPECIES (PERCENT)	29.27	27.10	23.90	31.12	8.81	.25
APPRAISED STUMPAGE ($/MBF)	20.55	28.11	10.99	15.18	4.27	-1.77
OVERBID ($/MBF)	50.39	25.16	13.39	21.86	6.07	4.15
ROAD COSTS ($/MBF)	13.57	3.92	6.14	7.20	2.06	4.68
HAUL DISTANCE (MILES)	37.00	30.91	23.47	19.57	5.93	1.03
LOGGING COST ($/MBF)	45.09	39.72	9.45	12.19	3.45	1.55
MANUFACTURING COSTS ($/MBF)	45.97	40.44	11.98	9.52	2.91	1.90
NUMBER OF BIDDERS	6.57	3.80	1.74	2.55	.71	3.89
SELLING VALUE ($/MBF)	138.95	124.68	20.24	20.06	5.88	2.43
COMPETITIVE STATUS	2.00	1.89	0.00	.32	.09	1.33
TERMINATION PERIOD (YEARS)	4.86	1.21	1.61	1.60	.47	7.78

NOTES

1. NUMBER OF OBSERVATIONS ARE 14 AND 70, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 82 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9882.

TABLE 24--RESULTS FOR ORAL AND SEALED BID ANALYSIS, REGION 6 ZONE 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	6.05	6.71	5.63	8.37	.90	-.73
SALVAGE STATUS	1.66	1.57	.47	.50	.06	1.60
SET-ASIDE STATUS	1.80	1.82	.40	.39	.05	-.38
SALES VOLUME (MMBF)	6.04	4.41	5.97	5.29	.72	2.27
MAJOR SPECIES (PERCENT)	54.72	45.89	37.30	42.06	5.03	1.76
APPRAISED STUMPAGE ($/MBF)	36.82	31.09	17.10	17.14	2.18	2.63
OVERBID ($/MBF)	10.81	11.63	15.90	13.88	1.91	-.43
ROAD COSTS ($/MBF)	4.85	2.93	6.17	4.77	.71	2.71
HAUL DISTANCE (MILES)	33.45	33.87	14.75	13.96	1.83	-.23
LOGGING COST ($/MBF)	38.07	38.09	10.48	9.61	1.28	-.01
MANUFACTURING COSTS ($/MBF)	54.12	48.32	6.14	12.32	1.21	4.80
NUMBER OF BIDDERS	2.73	2.76	1.74	1.71	.22	-.11
FIBER (PERCENT)	1.35	1.86	8.95	11.32	1.28	-.40
SELLING VALUE ($/MBF)	150.87	135.45	17.13	26.97	2.82	5.46
COMPETITIVE STATUS	1.66	1.86	.47	.35	.05	-3.68
TERMINATION PERIOD (YEARS)	3.22	2.39	1.73	1.83	.23	3.65

NOTES

1. NUMBER OF OBSERVATIONS ARE 134 AND 115, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 247 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9687.

TABLE 25--RESULTS FOR ORAL AND SEALED BID ANALYSIS, REGION 6 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	22.68	21.77	17.71	21.29	1.62	.56
SALVAGE STATUS	1.70	1.60	.46	.49	.04	2.55
SET-ASIDE STATUS	1.87	1.69	.33	.46	.03	5.42
SALES VOLUME (MMBF)	5.02	4.10	5.15	4.90	.40	2.27
MAJOR SPECIES (PERCENT)	59.28	54.63	27.25	31.34	2.42	1.92
APPRAISED STUMPAGE ($/MBF)	52.82	48.98	18.12	17.41	1.43	2.68
OVERBID ($/MBF)	28.52	36.16	24.81	31.14	2.35	-3.26
ROAD COSTS ($/MBF)	5.36	4.29	7.07	6.48	.54	2.02
HAUL DISTANCE (MILES)	38.32	37.87	16.50	16.39	1.33	.34
LOGGING COST ($/MBF)	45.70	44.10	15.91	11.51	1.08	1.48
MANUFACTURING COSTS ($/MBF)	65.86	59.76	10.57	11.53	.91	6.73
NUMBER OF BIDDERS	5.47	5.46	3.08	3.22	.26	.05
FIBER (PERCENT)	9.10	8.63	9.77	8.34	.72	.64
SELLING VALUE ($/MBF)	192.19	177.21	30.62	25.85	2.24	6.67
COMPETITIVE STATUS	1.94	1.96	.23	.19	.02	-1.29
TERMINATION PERIOD (YEARS)	3.16	2.21	1.77	1.64	.14	6.93

NOTES

1. NUMBER OF OBSERVATIONS ARE 242 AND 412, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 652 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9626.

TABLE 26--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 1 ZONE 2 GROUP 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	7.33	4.76	8.82	6.68	1.51	1.70
SALVAGE STATUS	1.42	1.41	.50	.49	.11	.15
SET-ASIDE STATUS	1.96	1.95	.20	.22	.05	.29
SALES VOLUME (MMBF)	.95	.43	1.02	.45	.12	4.20
MAJOR SPECIES (PERCENT)	9.74	16.27	14.40	20.97	4.30	-1.52
APPRAISED STUMPAGE ($/MBF)	21.68	26.45	19.31	16.12	3.57	-1.34
OVERBID ($/MBF)	6.38	7.49	11.14	7.94	1.83	-.61
ROAD COSTS ($/MBF)	5.51	1.17	11.33	4.21	1.27	3.42
HAUL DISTANCE (MILES)	36.92	29.98	21.48	17.49	3.89	1.78
LOGGING COST ($/MBF)	47.95	47.85	7.04	11.66	2.37	.04
MANUFACTURING COSTS ($/MBF)	49.95	54.02	15.84	9.28	2.27	-1.79
NUMBER OF BIDDERS	2.04	2.32	1.11	1.55	.32	-.88
FIBER (PERCENT)	20.36	9.74	38.93	27.23	6.29	1.69
SELLING VALUE ($/MBF)	140.66	145.48	36.18	22.74	5.42	-1.00
COMPETITIVE STATUS	1.65	1.87	.49	.34	.08	-2.70
TERMINATION PERIOD (YEARS)	1.85	.99	1.38	.64	.17	4.97

NOTES

1. NUMBER OF OBSERVATIONS ARE 26 AND 135, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 159 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9740.
4. GROUP 1 ARE SALES BETWEEN 0 AND 2000 MBF.

TABLE 27--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 1 ZONE 2 GROUP 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	7.92	5.91	3.94	4.39	1.11	1.81
SALVAGE STATUS	1.83	1.90	.39	.31	.09	-.80
SET-ASIDE STATUS	1.96	1.85	.21	.37	.08	1.32
SALES VOLUME (MMBF)	4.62	4.84	1.69	1.78	.46	-.48
MAJOR SPECIES (PERCENT)	16.74	23.28	13.49	19.36	4.58	-1.43
APPRAISED STUMPAGE ($/MBF)	17.29	14.05	12.07	13.47	3.41	.95
OVERBID ($/MBF)	6.52	12.28	7.25	9.62	2.32	-2.48
ROAD COSTS ($/MBF)	10.24	12.50	9.55	11.04	2.77	-.82
HAUL DISTANCE (MILES)	28.35	33.95	13.33	15.48	3.87	-1.45
LOGGING COST ($/MBF)	51.94	49.15	12.77	11.86	3.21	.87
MANUFACTURING COSTS ($/MBF)	56.56	53.35	4.17	10.48	2.29	1.40
NUMBER OF BIDDERS	2.13	2.79	.81	1.45	.33	-2.01
FIBER (PERCENT)	3.16	5.24	7.21	18.50	4.04	-.52
SELLING VALUE ($/MBF)	150.19	142.15	10.53	23.19	5.13	1.57
COMPETITIVE STATUS	1.74	1.90	.45	.31	.10	-1.65
TERMINATION PERIOD (YEARS)	3.26	3.44	1.21	1.37	.35	-.51

NOTES

1. NUMBER OF OBSERVATIONS ARE 23 AND 39, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 60 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9989.
4. GROUP 2 ARE SALES BETWEEN 2000 AND 8000 MBF.

TABLE 28--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 1 ZONE 2 GROUP 3

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	9.78	12.11	7.66	8.81	2.74	-.85
SALVAGE STATUS	2.00	1.95	0.00	.21	.05	.85
SET-ASIDE STATUS	2.00	1.73	0.00	.46	.11	2.38
SALES VOLUME (MMBF)	16.93	12.07	5.46	3.91	1.52	3.20
MAJOR SPECIES (PERCENT)	11.11	15.55	14.96	15.62	5.04	-.88
APPRAISED STUMPAGE ($/MBF)	17.33	17.99	14.26	14.82	4.79	-.14
OVERBID ($/MBF)	9.71	14.74	10.15	10.46	3.40	-1.48
ROAD COSTS ($/MBF)	16.59	12.76	12.90	10.13	3.73	1.03
HAUL DISTANCE (MILES)	37.94	39.82	17.18	25.68	7.40	-.25
LOGGING COST ($/MBF)	47.46	44.74	6.87	10.37	2.98	.91
MANUFACTURING COSTS ($/MBF)	56.10	54.63	4.78	5.24	1.66	.88
NUMBER OF BIDDERS	2.69	3.14	1.25	1.73	.51	-.88
FIBER (PERCENT)	4.48	7.42	5.75	21.92	5.64	-.52
SELLING VALUE ($/MBF)	151.20	144.10	9.52	17.78	4.90	1.45
COMPETITIVE STATUS	1.88	1.95	.34	.21	.09	-.88
TERMINATION PERIOD (YEARS)	5.63	4.77	.81	1.38	.39	2.21

NOTES

1. NUMBER OF OBSERVATIONS ARE 16 AND 22, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 36 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.0256.
4. GROUP 3 ARE SALES OVER 8000 MBF.

TABLE 29--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 5 ZONE 1 GROUP 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	3.66	5.81	5.16	9.10	2.27	-.94
SALVAGE STATUS	1.12	1.29	.33	.45	.11	-1.46
SET-ASIDE STATUS	2.00	1.96	0.00	.19	.05	.81
SALES VOLUME (MMBF)	.77	.39	.58	.44	.12	3.13
MAJOR SPECIES (PERCENT)	5.32	4.43	15.00	12.42	3.34	.27
APPRAISED STUMPAGE ($/MBF)	28.58	26.46	13.93	13.97	3.65	.58
OVERBID ($/MBF)	12.01	14.46	12.46	14.01	3.61	-.68
ROAD COSTS ($/MBF)	1.41	.28	2.96	1.66	.49	2.28
HAUL DISTANCE (MILES)	33.24	34.80	16.78	13.82	3.73	-.42
LOGGING COST ($/MBF)	44.60	39.83	9.98	11.53	2.96	1.61
MANUFACTURING COSTS ($/MBF)	40.54	28.23	10.91	20.12	5.01	2.46
NUMBER OF BIDDERS	2.53	2.37	1.46	1.60	.41	.38
FIBER (PERCENT)	0.00	4.51	0.00	14.10	3.43	-1.31
SELLING VALUE ($/MBF)	129.52	106.15	21.60	34.22	8.58	2.72
COMPETITIVE STATUS	1.76	1.76	.44	.43	.11	.03
TERMINATION PERIOD (YEARS)	.82	.58	.81	.63	.17	1.41

NOTES

1. NUMBER OF OBSERVATIONS ARE 17 AND 105, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 120 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9789.
4. GROUP 1 ARE SALES BETWEEN 0 AND 2000 MBF.

TABLE 30--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 5 ZONE 1 GROUP 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	5.03	6.62	3.13	4.64	1.74	-.91
SALVAGE STATUS	1.78	1.81	.44	.40	.17	-.20
SET-ASIDE STATUS	1.89	1.88	.33	.34	.14	.10
SALES VOLUME (MMBF)	4.72	4.32	1.44	1.72	.68	.58
MAJOR SPECIES (PERCENT)	8.61	9.65	10.45	14.45	5.50	-.19
APPRAISED STUMPAGE ($/MBF)	17.68	18.30	10.00	14.10	5.34	-.12
OVERBID ($/MBF)	43.15	26.77	39.49	21.03	12.01	1.36
ROAD COSTS ($/MBF)	14.61	10.02	6.85	11.56	4.24	1.08
HAUL DISTANCE (MILES)	40.11	29.56	15.10	12.35	5.57	1.89
LOGGING COST ($/MBF)	41.58	45.57	6.62	16.72	5.86	-.68
MANUFACTURING COSTS ($/MBF)	44.22	41.59	4.66	2.17	1.36	1.94
NUMBER OF BIDDERS	4.00	4.38	1.73	2.06	.81	-.46
SELLING VALUE ($/MBF)	131.25	128.04	16.61	12.70	5.91	.54
COMPETITIVE STATUS	1.89	1.88	.33	.34	.14	.10
TERMINATION PERIOD (YEARS)	3.33	2.81	1.22	1.56	.60	.86

NOTES

1. NUMBER OF OBSERVATIONS ARE 9 AND 16, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 23 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.0632.
4. GROUP 2 ARE SALES BETWEEN 2000 AND 8000 MBF.

TABLE 31--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 5 ZONE 1 GROUP 3

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	8.65	6.06	5.06	2.69	1.54	1.68
SALVAGE STATUS	1.94	2.00	.25	0.00	.07	-.87
SET-ASIDE STATUS	1.69	2.00	.47	0.00	.14	-2.28
SALES VOLUME (MMBF)	13.55	23.46	6.08	5.64	2.02	-4.91
MAJOR SPECIES (PERCENT)	5.62	7.66	8.86	13.45	3.47	-.59
APPRAISED STUMPAGE ($/MBF)	21.80	23.77	16.57	9.94	5.12	-.38
OVERBID ($/MBF)	39.86	46.74	23.41	25.98	9.16	-.84
ROAD COSTS ($/MBF)	10.87	12.39	6.30	7.02	2.20	-.69
HAUL DISTANCE (MILES)	35.69	33.25	13.52	10.50	4.33	.56
LOGGING COST ($/MBF)	39.01	38.06	12.09	4.82	3.61	.26
MANUFACTURING COSTS ($/MBF)	43.15	44.01	2.34	1.93	.76	-1.13
NUMBER OF BIDDERS	4.88	4.83	2.04	1.64	.66	.06
SELLING VALUE ($/MBF)	126.89	131.13	16.72	11.84	5.28	-.80
COMPETITIVE STATUS	1.97	2.00	.18	0.00	.05	-.61
TERMINATION PERIOD (YEARS)	5.09	6.58	1.23	1.08	.40	-3.69

NOTES

1. NUMBER OF OBSERVATIONS ARE 32 AND 12, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 42 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.0161.
4. GROUP 3 ARE SALES OVER 8000 MBF.

TABLE 32--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 5 ZONE 2 GROUP 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	1.27	5.55	1.84	11.35	4.73	-.90
SALVAGE STATUS	1.17	1.43	.41	.51	.24	-1.10
SET-ASIDE STATUS	1.83	2.00	.41	0.00	.10	-1.59
SALES VOLUME (MMBF)	1.14	.94	.45	.92	.40	.52
MAJOR SPECIES (PERCENT)	1.88	8.16	2.85	13.77	5.76	-1.09
APPRAISED STUMPAGE ($/MBF)	38.26	31.75	16.83	20.94	9.70	.67
OVERBID ($/MBF)	12.92	8.23	13.88	7.08	4.62	1.01
ROAD COSTS ($/MBF)	.72	.91	1.13	1.89	.83	-.23
HAUL DISTANCE (MILES)	44.00	36.64	11.93	12.98	6.20	1.19
LOGGING COST ($/MBF)	40.67	34.82	5.80	4.59	2.42	2.42
MANUFACTURING COSTS ($/MBF)	44.10	38.33	1.52	7.48	3.13	1.84
NUMBER OF BIDDERS	2.67	2.07	1.37	1.00	.54	1.10
SELLING VALUE ($/MBF)	139.18	116.65	13.07	26.33	11.42	1.97
COMPETITIVE STATUS	1.67	1.79	.52	.43	.22	-.54
TERMINATION PERIOD (YEARS)	1.00	.36	0.00	.84	.35	1.84

NOTES

1. NUMBER OF OBSERVATIONS ARE 6 AND 14, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 18 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.0922.
4. GROUP 1 ARE SALES BETWEEN 0 AND 2000 MBF.

TABLE 33--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 5 ZONE 2 GROUP 2

SALE CHAPACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	3.25	8.81	1.65	4.62	1.76	-3.15
SALVAGE STATUS	1.25	2.00	.46	0.00	.24	-3.16
SET-ASIDE STATUS	1.75	1.25	.46	.50	.29	1.72
SALES VOLUME (MMBF)	5.50	6.07	1.87	1.72	1.12	-.51
MAJOR SPECIES (PERCENT)	6.50	2.90	9.57	2.61	4.98	.72
APPRAISED STUMPAGE ($/MBF)	20.48	15.37	14.01	6.33	7.48	.68
OVERBID ($/MBF)	18.79	48.37	17.00	10.20	9.36	-3.16
ROAD COSTS ($/MBF)	6.90	16.01	5.50	9.45	4.24	-2.15
HAUL DISTANCE (MILES)	52.12	45.25	24.19	23.84	14.75	.47
LOGGING COST ($/MBF)	44.90	42.67	10.82	10.77	6.62	.34
MANUFACTURING COSTS ($/MBF)	39.79	51.26	10.12	16.33	7.54	-1.52
NUMBER OF BIDDERS	5.38	5.75	2.77	1.71	1.53	-.24
SELLING VALUE ($/MBF)	124.59	139.21	28.17	19.66	15.87	-.92
COMPETITIVE STATUS	1.88	2.00	.35	0.00	.18	-.69
TERMINATION PERIOD (YEARS)	2.50	2.50	1.69	1.00	.93	0.00

NOTES

1. NUMBER OF OBSERVATIONS ARE 8 AND 4, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 10 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.1987.
4. GROUP 2 ARE SALES BETWEEN 2000 AND 8000 MBF.

TABLE 34--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 5 ZONE 2 GROUP 3

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	4.65	7.16	2.66	5.77	1.86	-1.35
SALVAGE STATUS	1.17	2.00	.39	0.00	.12	-6.74
SET-ASIDE STATUS	1.75	1.50	.45	.53	.21	1.20
SALES VOLUME (MMBF)	13.21	13.41	3.97	4.39	1.78	-.11
MAJOR SPECIES (PERCENT)	2.58	10.19	4.33	21.19	6.24	-1.22
APPRAISED STUMPAGE ($/MBF)	22.49	25.94	10.75	12.49	4.95	-.70
OVERBID ($/MBF)	22.89	56.28	21.96	12.05	7.78	-4.29
ROAD COSTS ($/MBF)	8.03	8.77	3.50	6.32	2.13	-.35
HAUL DISTANCE (MILES)	58.83	43.50	31.70	15.37	10.99	1.40
LOGGING COST ($/MBF)	42.08	36.65	8.76	8.86	3.77	1.44
MANUFACTURING COSTS ($/MBF)	42.66	49.37	4.29	12.79	3.92	-1.71
NUMBER OF BIDDERS	5.25	7.30	3.19	2.50	1.24	-1.65
SELLING VALUE ($/MBF)	129.83	134.56	9.78	16.40	5.64	-.84
COMPETITIVE STATUS	1.83	2.00	.39	0.00	.12	-1.35
TERMINATION PERIOD (YEARS)	2.42	4.10	1.62	1.52	.68	-2.49

NOTES

1. NUMBER OF OBSERVATIONS ARE 12 AND 10, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 20 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.0788.
4. GROUP 3 ARE SALES OVER 8000 MBF.

TABLE 35--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 5 ZONE 3 GROUP 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	6.83	12.33	3.86	12.48	4.92	-1.12
SALVAGE STATUS	1.86	2.00	.38	0.00	.12	-1.15
SET-ASIDE STATUS	2.00	1.44	0.00	.53	.20	2.77
SALES VOLUME (MMBF)	6.12	3.72	1.03	1.59	.69	3.46
MAJOR SPECIES (PERCENT)	35.61	41.56	26.51	31.27	14.78	-.40
APPRAISED STUMPAGE ($/MBF)	18.53	17.31	12.43	6.95	4.88	.25
OVERBID ($/MBF)	52.71	35.86	13.77	15.50	7.45	2.26
ROAD COSTS ($/MBF)	13.43	13.43	6.79	9.99	4.41	.00
HAUL DISTANCE (MILES)	28.86	33.67	16.57	19.19	9.13	-.53
LOGGING COST ($/MBF)	44.83	44.20	6.88	5.93	3.20	.20
MANUFACTURING COSTS ($/MBF)	41.77	46.32	2.25	8.41	3.29	-1.38
NUMBER OF BIDDERS	5.86	5.44	1.07	1.42	.65	.64
SELLING VALUE ($/MBF)	131.35	134.58	10.65	17.21	7.44	-.43
TERMINATION PERIOD (YEARS)	4.00	3.11	1.41	1.27	.67	1.32

NOTES

1. NUMBER OF OBSERVATIONS ARE 7 AND 9, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 14 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.1302.
4. GROUP 2 ARE SALES BETWEEN 2000 AND 8000 MBF.

TABLE 36--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE) ANALYSIS, REGION 5 ZONE 3 GROUP 3

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	10.00	8.04	6.31	5.20	3.24	.60
SET-ASIDE STATUS	1.57	1.67	.53	.52	.29	-.33
SALES VOLUME (MMBF)	19.50	13.96	9.03	5.00	4.16	1.33
MAJOR SPECIES (PERCENT)	22.93	34.77	20.99	18.89	11.16	-1.06
APPRAISED STUMPAGE ($/MBF)	22.57	16.84	9.89	11.93	6.05	.95
OVERBID ($/MBF)	48.08	51.55	13.66	11.42	7.06	-.49
ROAD COSTS ($/MBF)	13.71	14.97	5.97	6.24	3.39	-.37
HAUL DISTANCE (MILES)	45.14	36.83	27.64	19.11	13.43	.62
LOGGING COST ($/MBF)	45.34	38.62	12.09	6.44	5.52	1.22
MANUFACTURING COSTS ($/MBF)	50.18	44.71	16.27	5.62	7.01	.78
NUMBER OF BIDDERS	7.29	8.33	2.06	2.50	1.26	-.83
SELLING VALUE ($/MBF)	146.56	127.56	25.29	18.44	12.48	1.52
TERMINATION PERIOD (YEARS)	5.71	4.83	1.38	.98	.68	1.30

NOTES

1. NUMBER OF OBSERVATIONS ARE 7 AND 6, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 11 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 2.1769.
4. GROUP 3 ARE SALES OVER 8000 MBF.

TABLE 37--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE) ANALYSIS, REGION 6 ZONE 1 GROUP 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	3.61	4.63	5.49	6.15	1.14	-.90
SALVAGE STATUS	1.29	1.28	.46	.45	.09	.11
SET-ASIDE STATUS	1.73	1.91	.45	.28	.07	-2.52
SALES VOLUME (MMBF)	.98	.49	.64	.45	.11	4.66
MAJOR SPECIES (PERCENT)	61.68	43.04	41.87	43.01	8.25	2.26
APPRAISED STUMPAGE ($/MBF)	35.44	29.08	18.56	17.74	3.52	1.81
OVERBID ($/MBF)	8.00	5.97	15.16	6.04	2.17	.94
ROAD COSTS ($/MBF)	1.70	.47	5.81	2.27	.83	1.49
HAUL DISTANCE (MILES)	33.31	33.21	14.47	12.75	2.63	.04
LOGGING COST ($/MBF)	38.67	39.25	11.24	9.68	2.02	-.29
MANUFACTURING COSTS ($/MBF)	53.78	47.33	5.24	14.12	2.13	3.02
NUMBER OF BIDDERS	2.27	2.33	1.51	1.39	.28	-.22
FIBER (PERCENT)	1.15	.26	3.94	1.39	.55	1.61
SELLING VALUE ($/MBF)	146.23	130.86	14.02	28.06	4.41	3.48
COMPETITIVE STATUS	1.57	1.79	.50	.41	.09	-2.52
TERMINATION PERIOD (YEARS)	1.65	.91	.93	.66	.15	4.82

NOTES

1. NUMBER OF OBSERVATIONS ARE 49 AND 58, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 105 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9818.
4. GROUP 1 ARE SALES BETWEEN 0 AND 2001 MBF.

TABLE 38--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 6 ZONE 1 GROUP 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	7.12	6.58	6.42	5.33	1.42	.37
SALVAGE STATUS	1.82	1.79	.39	.42	.09	.41
SET-ASIDE STATUS	1.80	1.71	.40	.46	.10	.90
SALES VOLUME (MMBF)	5.13	4.77	1.60	1.81	.39	.93
MAJOR SPECIES (PERCENT)	41.85	51.60	36.20	39.66	8.81	-1.11
APPRAISED STUMPAGE ($/MBF)	33.80	31.76	14.82	14.73	3.48	.59
OVERBID ($/MBF)	7.14	15.81	10.19	17.36	3.09	-2.80
ROAD COSTS ($/MBF)	6.19	4.69	5.93	6.01	1.40	1.06
HAUL DISTANCE (MILES)	32.00	34.04	14.14	15.31	3.42	-.59
LOGGING COST ($/MBF)	39.85	38.61	10.22	7.51	2.20	.56
MANUFACTURING COSTS ($/MBF)	55.42	50.36	5.39	7.08	1.42	3.56
NUMBER OF BIDDERS	.24	0.00	1.72	1.96	.43	.57
FIBER (PERCENT)	2.63	3.30	.81	0.00	.15	-2.42
SELLING VALUE ($/MBF)	152.62	140.90	14.49	17.42	3.66	3.20
COMPETITIVE STATUS	1.63	1.96	.49	.19	.10	-3.50
TERMINATION PERIOD (YEARS)	3.55	3.04	1.46	1.23	.33	1.58

NOTES

1. NUMBER OF OBSERVATIONS ARE 51 AND 28, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 77 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9901.
4. GROUP 2 ARE SALES BETWEEN 2000 AND 8000 MBF.

TABLE 39--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 6 ZONE 1 GROUP 3

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	7.97	10.99	4.06	12.37	2.25	-1.34
SALVAGE STATUS	1.97	1.93	.17	.26	.05	.73
SET-ASIDE STATUS	1.88	1.72	.33	.45	.10	1.60
SALES VOLUME (MMBF)	14.70	11.91	4.75	4.47	1.17	2.39
MAJOR SPECIES (PERCENT)	63.99	46.09	25.62	43.22	8.80	2.03
APPRAISED STUMPAGE ($/MBF)	43.33	34.47	16.84	18.07	4.40	2.01
OVERBID ($/MBF)	20.36	18.94	20.00	16.75	4.70	.31
ROAD COSTS ($/MBF)	7.38	6.16	5.18	4.59	1.24	.99
HAUL DISTANCE (MILES)	35.82	35.03	16.14	15.28	3.98	.20
LOGGING COST ($/MBF)	34.55	35.25	9.07	10.92	2.52	-.28
MANUFACTURING COSTS ($/MBF)	52.67	48.33	7.94	12.56	2.61	1.66
NUMBER OF BIDDERS	3.56	3.38	1.85	1.84	.47	.39
FIBER (PERCENT)	3.31	6.87	17.12	21.97	4.93	-.72
SELLING VALUE ($/MBF)	154.95	139.37	22.92	31.24	6.84	2.28
COMPETITIVE STATUS	1.85	1.90	.36	.31	.09	-.51
TERMINATION PERIOD (YEARS)	4.97	4.72	.76	.88	.21	1.19

NOTES

1. NUMBER OF OBSERVATIONS ARE 34 AND 29, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 61 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9983.
4. GROUP 3 ARE SALES OVER 8000 MBF.

TABLE 40--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 6 ZONE 2 GROUP 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	14.03	13.70	14.85	21.09	2.33	.15
SALVAGE STATUS	1.39	1.32	.49	.47	.06	1.30
SET-ASIDE STATUS	1.89	1.78	.31	.41	.05	2.35
SALES VOLUME (MMBF)	.69	.56	.51	.54	.06	2.07
MAJOR SPECIES (PERCENT)	62.15	52.60	28.80	34.89	3.99	2.39
APPRAISED STUMPAGE ($/MBF)	53.95	48.51	17.53	18.53	2.20	2.47
OVERBID ($/MBF)	19.42	32.12	18.55	37.26	3.91	-3.25
ROAD COSTS ($/MBF)	.66	1.16	2.44	3.82	.41	-1.20
HAUL DISTANCE (MILES)	37.06	36.62	16.48	15.04	1.88	.23
LOGGING COST ($/MBF)	49.49	47.43	21.20	13.24	1.97	1.04
MANUFACTURING COSTS ($/MBF)	67.01	58.00	14.58	14.38	1.74	5.17
NUMBER OF BIDDERS	3.75	3.88	2.36	2.57	.30	-.41
FIBER (PERCENT)	8.17	6.93	12.60	8.31	1.20	1.04
SELLING VALUE ($/MBF)	193.45	174.81	38.65	30.17	4.01	4.65
COMPETITIVE STATUS	1.88	1.93	.32	.25	.03	-1.50
TERMINATION PERIOD (YEARS)	1.60	1.00	.76	.81	.10	6.19

NOTES

1. NUMBER OF OBSERVATIONS ARE 102 AND 208, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 308 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9668.
4. GROUP 1 ARE SALES BETWEEN 0 AND 2000 MBF.

TABLE 41--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE)
ANALYSIS, REGION 6 ZONE 2 GROUP 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	26.10	26.13	15.60	15.29	2.23	-.01
SALVAGE STATUS	1.90	1.83	.31	.38	.05	1.26
SET-ASIDE STATUS	1.68	1.55	.32	.50	.06	5.19
SALES VOLUME (MMBF)	4.86	4.68	1.63	1.64	.24	.75
MAJOR SPECIES (PERCENT)	57.14	56.70	28.79	28.64	4.16	.11
APPRAISED STUMPAGE ($/MBF)	53.64	50.20	21.07	17.69	2.76	1.25
OVERBID ($/MBF)	36.07	38.34	30.06	23.59	3.80	-.60
ROAD COSTS ($/MBF)	8.88	7.06	8.42	7.41	1.13	1.60
HAUL DISTANCE (MILES)	37.23	38.51	16.13	16.34	2.36	-.54
LOGGING COST ($/MBF)	42.89	41.23	9.85	8.38	1.30	1.28
MANUFACTURING COSTS ($/MBF)	65.38	61.90	6.74	5.74	.89	3.91
NUMBER OF BIDDERS	6.32	6.62	2.69	2.91	.41	-.71
FIBER (PERCENT)	9.20	9.94	6.63	7.55	1.05	-.70
SELLING VALUE ($/MBF)	193.58	180.69	26.03	21.35	3.37	3.83
COMPETITIVE STATUS	2.00	1.99	0.00	.09	.01	.78
TERMINATION PERIOD (YEARS)	3.69	2.77	1.22	1.14	.17	5.42

NOTES

1. NUMBER OF OBSERVATIONS ARE 77 AND 125, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 200 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9710.
4. GROUP 2 ARE SALES BETWEEN 2000 AND 8000 MBF.

TABLE 42--RESULTS FOR ORAL AND SEALED BID (BY SALE SIZE) ANALYSIS, REGION 6 ZONE 2 GROUP 3

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS ORAL	SEALED	SAMPLE DEVIATIONS ORAL	SEALED	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	32.51	36.11	18.03	20.59	3.29	-1.10
SALVAGE STATUS	1.95	1.97	.21	.16	.03	-.71
SET-ASIDE STATUS	1.83	1.65	.38	.48	.07	2.42
SALES VOLUME (MMBF)	12.21	12.49	4.00	4.04	.68	-.41
MAJOR SPECIES (PERCENT)	57.23	56.73	22.27	24.87	4.01	.12
APPRAISED STUMPAGE ($/MBF)	49.97	48.30	14.87	13.61	2.40	.70
OVERBID ($/MBF)	34.01	43.34	22.08	20.89	3.62	-2.58
ROAD COSTS ($/MBF)	8.75	8.12	5.86	6.47	1.05	.60
HAUL DISTANCE (MILES)	41.68	40.13	16.78	19.50	3.10	.50
LOGGING COST ($/MBF)	42.99	39.87	9.61	7.81	1.46	2.14
MANUFACTURING COSTS ($/MBF)	64.58	61.01	5.64	9.06	1.31	2.73
NUMBER OF BIDDERS	7.21	7.78	3.16	3.05	.52	-1.11
FIBER (PERCENT)	10.47	11.06	7.45	8.74	1.38	-.43
SELLING VALUE ($/MBF)	188.44	178.01	19.02	18.60	3.17	3.29
COMPETITIVE STATUS	1.97	2.00	.18	0.00	.02	-1.60
TERMINATION PERIOD (YEARS)	5.03	4.49	1.20	.88	.17	3.08

NOTES

1. NUMBER OF OBSERVATIONS ARE 63 AND 79, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 140 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9761.
4. GROUP 3 ARE SALES OVER 8000 MBF.

TABLE 43--RESULTS FOR INSIDER AND OUTSIDER ANALYSIS, REGION 6 ZONE 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS INSIDERS	OUTSIDERS	SAMPLE DEVIATIONS INSIDERS	OUTSIDERS	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	6.16	8.03	6.45	8.90	.64	-2.93
SALVAGE STATUS	1.72	1.77	.45	.42	.04	-1.17
SET-ASIDE STATUS	1.85	1.72	.36	.45	.03	3.77
SALES VOLUME (MMBF)	5.56	6.54	5.62	5.86	.50	-1.94
MAJOR SPECIES (PERCENT)	48.12	45.74	37.94	38.74	3.39	.70
APPRAISED STUMPAGE ($/MBF)	21.73	23.42	17.80	19.54	1.62	-1.04
OVERBID ($/MBF)	7.89	15.28	13.08	16.57	1.25	-5.92
ROAD COSTS ($/MBF)	5.02	4.76	6.22	5.20	.53	.49
HAUL DISTANCE (MILES)	34.12	34.80	15.58	16.07	1.39	-.49
LOGGING COST ($/MBF)	35.43	34.93	9.69	9.34	.85	.59
MANUFACTURING COSTS ($/MBF)	50.27	50.42	9.58	8.80	.83	-.18
NUMBER OF BIDDERS	2.62	4.32	1.74	2.15	.17	-8.49
FIBER (PERCENT)	3.10	3.75	10.51	11.65	.96	-.67
SELLING VALUE ($/MBF)	124.90	126.38	24.17	25.65	2.18	-.68
COMPETITIVE STATUS	1.56	1.81	.50	.39	.04	-6.05
TERMINATION PERIOD (YEARS)	3.21	3.42	1.79	1.84	.16	-1.29

NOTES

1. NUMBER OF OBSERVATIONS ARE 485 AND 172, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 655 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9626.

TABLE 44--RESULTS FOR INSIDER AND OUTSIDER ANALYSIS, REGION 6 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS		SAMPLE DEVIATIONS		POOLED	
	INSIDERS	OUTSIDERS	INSIDERS	OUTSIDERS	DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	22.40	23.22	20.57	19.51	1.20	-.68
SALVAGE STATUS	1.63	1.73	.48	.44	.03	-3.53
SET-ASIDE STATUS	1.80	1.72	.40	.45	.02	3.15
SALES VOLUME (MMBF)	4.52	4.89	5.28	4.98	.31	-1.17
MAJOR SPECIES (PERCENT)	53.89	60.48	28.99	29.93	1.72	-3.82
APPRAISED STUMPAGE ($/MBF)	37.38	36.47	21.11	21.38	1.25	.73
OVERBID ($/MBF)	33.81	42.18	29.78	30.26	1.77	-4.74
ROAD COSTS ($/MBF)	5.45	6.19	7.61	8.11	.46	-1.62
HAUL DISTANCE (MILES)	38.92	39.03	17.02	17.21	1.01	-.11
LOGGING COST ($/MBF)	40.71	42.03	11.97	15.61	.75	-1.75
MANUFACTURING COSTS ($/MBF)	57.20	58.05	10.81	11.99	.65	-1.30
NUMBER OF BIDDERS	6.05	7.04	3.30	3.11	.19	-5.14
FIBER (PERCENT)	12.22	10.48	12.90	12.67	.76	2.29
SELLING VALUE ($/MBF)	158.19	160.30	28.87	34.57	1.77	-1.19
COMPETITIVE STATUS	1.94	1.97	.23	.18	.01	-1.75
TERMINATION PERIOD (YEARS)	2.81	2.76	1.77	1.77	.10	.45

NOTES

1. NUMBER OF OBSERVATIONS ARE 1536 AND 352, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 1886 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9602.

TABLE 45--RESULTS FOR SET-ASIDE AND OPEN ANALYSIS, REGION 1 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS		SAMPLE DEVIATIONS		POOLED	
	SET-ASIDE	OPEN	SET-ASIDE	OPEN	DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	8.09	6.84	5.86	6.04	.99	1.27
SALVAGE STATUS	1.79	1.73	.41	.44	.07	.81
SALES VOLUME (MMBF)	5.23	4.94	4.65	5.60	.90	.32
MAJOR SPECIES (PERCENT)	14.62	15.67	15.90	17.97	2.91	-.36
APPRAISED STUMPAGE ($/MBF)	7.42	12.23	9.06	13.00	2.06	-2.33
OVERBID ($/MBF)	5.59	8.48	8.13	9.70	1.56	-1.85
ROAD COSTS ($/MBF)	11.09	7.65	8.21	8.52	1.39	2.47
HAUL DISTANCE (MILES)	30.42	33.06	13.49	23.78	3.72	-.71
LOGGING COST ($/MBF)	45.12	44.26	8.98	9.71	1.58	.54
MANUFACTURING COSTS ($/MBF)	47.88	49.15	7.49	6.59	1.10	-1.15
NUMBER OF BIDDERS	3.40	2.83	1.93	1.88	.31	1.81
SELLING VALUE ($/MBF)	108.90	118.38	19.83	22.19	3.59	-2.64
COMPETITIVE STATUS	1.60	1.75	.49	.43	.07	-2.01
TERMINATION PERIOD (YEARS)	3.56	2.95	1.53	1.93	.31	1.96

NOTES

1. NUMBER OF OBSERVATIONS ARE 43 AND 269, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 310 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9667.

TABLE 46--RESULTS FOR SET-ASIDE AND OPEN ANALYSIS, REGION 5 ZONE 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS SET-ASIDE	OPEN	SAMPLE DEVIATIONS SET-ASIDE	OPEN	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	9.66	8.17	7.06	7.92	1.89	.78
SALVAGE STATUS	2.00	1.86	0.00	.35	.08	1.75
SALES VOLUME (MMBF)	9.23	8.83	6.80	9.01	2.13	.19
MAJOR SPECIES (PERCENT)	14.27	7.96	15.06	15.95	3.82	1.65
APPRAISED STUMPAGE ($/MBF)	11.74	16.20	10.74	15.83	3.72	-1.20
OVERBID ($/MBF)	21.09	16.02	15.56	19.07	4.52	1.12
ROAD COSTS ($/MBF)	12.44	7.76	7.87	8.52	2.04	2.30
HAUL DISTANCE (MILES)	29.21	31.89	12.43	16.71	3.94	-.68
LOGGING COST ($/MBF)	32.87	32.39	4.43	9.74	2.26	.21
MANUFACTURING COSTS ($/MBF)	41.87	37.56	3.70	6.61	1.54	2.79
NUMBER OF BIDDERS	5.05	4.07	2.41	2.45	.59	1.67
SELLING VALUE ($/MBF)	107.48	102.44	11.78	19.32	4.52	1.12
COMPETITIVE STATUS	2.00	1.82	0.00	.38	.09	2.01
TERMINATION PERIOD (YEARS)	4.95	3.55	1.35	2.24	.52	2.66

NOTES

1. NUMBER OF OBSERVATIONS ARE 19 AND 193, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 210 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9704.

TABLE 47--RESULTS FOR SET-ASIDE AND OPEN ANALYSIS, REGION 5 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS SET-ASIDE	OPEN	SAMPLE DEVIATIONS SET-ASIDE	OPEN	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	5.89	4.30	4.58	4.95	1.20	1.32
SALVAGE STATUS	1.95	1.68	.22	.47	.11	2.61
SALES VOLUME (MMBF)	9.12	6.43	6.25	8.12	1.91	1.41
MAJOR SPECIES (PERCENT)	10.88	10.89	16.75	22.38	5.25	-.00
APPRAISED STUMPAGE ($/MBF)	24.96	15.38	16.94	16.00	3.99	2.40
OVERBID ($/MBF)	17.73	25.69	16.71	20.51	4.87	-1.64
ROAD COSTS ($/MBF)	7.21	4.28	5.40	5.87	1.42	2.06
HAUL DISTANCE (MILES)	40.38	46.88	20.20	56.15	12.51	-.52
LOGGING COST ($/MBF)	34.46	39.16	8.40	13.20	3.04	-1.55
MANUFACTURING COSTS ($/MBF)	39.78	40.27	5.88	6.17	1.50	-.33
NUMBER OF BIDDERS	4.38	5.04	1.69	2.89	.66	-1.00
SELLING VALUE ($/MBF)	119.56	108.77	14.84	18.43	4.37	2.47
COMPETITIVE STATUS	1.95	1.88	.22	.32	.07	.92
TERMINATION PERIOD (YEARS)	4.24	2.51	1.48	2.13	.50	3.49

NOTES

1. NUMBER OF OBSERVATIONS ARE 21 AND 77, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 96 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9839.

TABLE 48--RESULTS FOR SET-ASIDE AND OPEN ANALYSIS, REGION 5 ZONE 3

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS SET-ASIDE	OPEN	SAMPLE DEVIATIONS SET-ASIDE	OPEN	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	9.99	8.99	13.90	12.06	3.24	.31
SALVAGE STATUS	1.81	1.64	.40	.48	.13	1.36
SALES VOLUME (MMBF)	8.43	5.40	6.16	6.98	1.82	1.66
MAJOR SPECIES (PERCENT)	21.87	25.16	18.47	25.52	6.58	-.50
APPRAISED STUMPAGE ($/MBF)	11.09	15.82	9.66	14.83	3.81	-1.24
OVERBID ($/MBF)	27.70	25.87	20.21	23.85	6.21	.29
ROAD COSTS ($/MBF)	9.76	6.34	7.77	8.00	2.11	1.62
HAUL DISTANCE (MILES)	28.13	36.96	19.27	31.24	8.00	-1.11
LOGGING COST ($/MBF)	36.54	36.97	9.72	16.07	4.11	-.10
MANUFACTURING COSTS ($/MBF)	43.17	39.43	7.82	15.07	3.83	.97
NUMBER OF BIDDERS	5.56	5.21	2.22	2.92	.76	.46
SELLING VALUE ($/MBF)	111.01	108.42	17.09	35.35	8.98	.29
COMPETITIVE STATUS	1.94	1.87	.25	.34	.09	.79
TERMINATION PERIOD (YEARS)	4.06	2.56	2.14	2.07	.55	2.73

NOTES

1. NUMBER OF OBSERVATIONS ARE 16 AND 137, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 151 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9748.

TABLE 49--RESULTS FOR SET-ASIDE AND OPEN ANALYSIS, REGION 6 ZONE 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS SET-ASIDE	OPEN	SAMPLE DEVIATIONS SET-ASIDE	OPEN	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	8.31	6.31	7.53	7.02	.88	2.26
SALVAGE STATUS	1.90	1.75	.30	.44	.05	2.96
SALES VOLUME (MMBF)	6.41	5.93	4.77	5.98	.72	.66
MAJOR SPECIES (PERCENT)	33.14	50.06	37.25	36.75	4.57	-3.71
APPRAISED STUMPAGE ($/MBF)	17.20	16.62	16.04	15.94	1.98	.30
OVERBID ($/MBF)	12.69	9.01	16.11	14.56	1.84	2.00
ROAD COSTS ($/MBF)	6.55	5.01	6.16	5.97	.74	2.07
HAUL DISTANCE (MILES)	33.94	34.60	18.02	15.58	1.99	-.33
LOGGING COST ($/MBF)	32.11	34.17	7.14	9.20	1.10	-1.88
MANUFACTURING COSTS ($/MBF)	51.73	49.59	8.68	9.50	1.16	1.84
NUMBER OF BIDDERS	4.10	2.90	1.80	2.04	.25	4.84
FIBER (PERCENT)	4.22	4.31	10.13	12.35	1.49	-.06
SELLING VALUE ($/MBF)	118.68	116.38	15.27	21.36	2.53	.91
COMPETITIVE STATUS	1.72	1.53	.45	.50	.06	3.15
TERMINATION PERIOD (YEARS)	4.11	3.28	1.63	1.78	.22	3.82

NOTES

1. NUMBER OF OBSERVATIONS ARE 79 AND 370, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 447 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9643.

TABLE 50--RESULTS FOR SET-ASIDE AND OPEN ANALYSIS, REGION 6 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS SET-ASIDE	SAMPLE MEANS OPEN	SAMPLE DEVIATIONS SET-ASIDE	SAMPLE DEVIATIONS OPEN	POOLED DEVIATIONS	T-TEST
VOLUME/ACRE (MBF)	23.81	22.36	20.06	20.60	1.38	1.04
SALVAGE STATUS	1.78	1.63	.41	.48	.03	4.97
SALES VOLUME (MMBF)	5.82	4.28	5.22	5.23	.35	4.36
MAJOR SPECIES (PERCENT)	56.84	54.07	27.31	29.44	1.96	1.42
APPRAISED STUMPAGE ($/MBF)	32.75	31.22	20.35	19.97	1.35	1.13
OVERBID ($/MBF)	31.85	37.63	23.93	32.52	2.09	-2.77
ROAD COSTS ($/MBF)	7.97	5.42	8.71	7.80	.54	4.72
HAUL DISTANCE (MILES)	42.00	38.51	15.67	17.54	1.16	3.01
LOGGING COST ($/MBF)	38.12	39.91	10.43	12.71	.83	-2.17
MANUFACTURING COSTS ($/MBF)	55.26	55.55	9.55	10.48	.69	-.42
NUMBER OF BIDDERS	6.65	6.54	2.79	3.39	.22	.50
FIBER (PERCENT)	12.31	13.30	10.86	14.75	.95	-1.05
SELLING VALUE ($/MBF)	150.46	148.12	22.45	25.31	1.67	1.40
COMPETITIVE STATUS	1.97	1.93	.18	.25	.02	2.19
TERMINATION PERIOD (YEARS)	3.53	2.77	1.56	1.78	.12	6.46

NOTES

1. NUMBER OF OBSERVATIONS ARE 278 AND 1039, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE T VALUE FOR 1315 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 1.9606.

TABLE 51--RESULTS FOR SET ASIDE, SMALL OPEN AND LARGE OPEN ANALYSIS, REGION 1 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS SET ASIDE	SM OPEN	LR OPEN	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	8.09	6.03	7.33	83.37	35.98	2.32
SALVAGE STATUS	1.79	1.68	1.77	.32	.19	1.66
SALES VOLUME (MMBF)	5.23	2.85	6.22	362.06	27.82	13.01
MAJOR SPECIES (PERCENT)	14.62	14.96	16.10	61.60	314.14	.20
APPRAISED STUMPAGE ($/MBF)	7.42	13.09	11.70	488.81	157.40	3.11
OVERBID ($/MBF)	5.59	7.68	8.97	207.88	90.16	2.31
ROAD COSTS ($/MBF)	11.09	4.27	9.72	1156.60	66.03	17.52
HAUL DISTANCE (MILES)	30.42	28.25	35.99	2030.06	502.86	4.04
LOGGING COST ($/MBF)	45.12	44.04	44.40	17.67	92.76	.19
MANUFACTURING COSTS ($/MBF)	47.88	49.20	49.12	29.90	45.30	.66
NUMBER OF BIDDERS	3.40	2.68	2.93	7.87	3.57	2.21
FIBER (PERCENT)	5.43	4.76	6.19	64.92	308.63	.21
SELLING VALUE ($/MBF)	108.90	116.59	119.47	1926.62	478.99	4.02
COMPETITIVE STATUS	1.60	1.77	1.74	.44	.20	2.26
TERMINATION PERIOD (YEARS)	3.56	2.13	3.46	62.63	3.20	19.60

NOTES

1. NUMBER OF OBSERVATIONS ARE 43, 102, AND 167, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 2 AND 309 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 3.0245.

TABLE 52--RESULTS FOR SET ASIDE, SMALL OPEN AND LARGE OPEN ANALYSIS, REGION 5 ZONE 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS SET ASIDE	SM OPEN	LR OPEN	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	9.66	7.03	8.77	83.47	61.38	1.36
SALVAGE STATUS	2.00	1.79	1.90	.42	.11	3.87
SALES VOLUME (MMBF)	9.23	6.44	10.07	288.05	75.90	3.80
MAJOR SPECIES (PERCENT)	14.27	7.71	8.10	331.10	253.47	1.31
APPRAISED STUMPAGE ($/MBF)	11.74	16.90	15.84	188.12	240.48	.78
OVERBID ($/MBF)	21.09	17.74	15.13	359.58	353.93	1.02
ROAD COSTS ($/MBF)	12.44	6.88	8.21	219.23	71.74	3.06
HAUL DISTANCE (MILES)	29.21	31.12	32.29	88.89	270.19	.33
LOGGING COST ($/MBF)	32.87	33.11	32.02	27.58	88.93	.31
MANUFACTURING COSTS ($/MBF)	41.87	36.68	38.02	191.42	41.12	4.65
NUMBER OF BIDDERS	5.05	3.89	4.16	9.50	6.00	1.58
FIBER (PERCENT)	0.00	1.25	.17	27.93	18.78	1.49
SELLING VALUE ($/MBF)	107.48	102.86	102.22	218.24	355.68	.61
COMPETITIVE STATUS	2.00	1.83	1.82	.26	.13	1.93
TERMINATION PERIOD (YEARS)	4.95	2.95	3.87	34.02	4.59	7.41

NOTES

1. NUMBER OF OBSERVATIONS ARE 18, 66, AND 127, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 2 AND 208 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 3.0391.

TABLE 53--RESULTS FOR SET ASIDE, SMALL OPEN AND LARGE OPEN ANALYSIS, REGION 5 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS SET ASIDE	SM OPEN	LR OPEN	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	5.89	4.47	4.21	21.28	24.02	.89
SALVAGE STATUS	1.95	1.52	1.76	1.14	.18	6.47
SALES VOLUME (MMBF)	9.12	3.72	7.90	212.97	57.74	3.69
MAJOR SPECIES (PERCENT)	10.88	5.61	13.74	578.74	447.45	1.29
APPRAISED STUMPAGE ($/MBF)	24.96	17.32	14.33	835.25	263.46	3.17
OVERBID ($/MBF)	17.73	18.52	29.57	1594.56	372.80	4.28
ROAD COSTS ($/MBF)	7.21	2.27	5.36	154.24	31.98	4.82
HAUL DISTANCE (MILES)	40.38	44.67	48.08	450.93	2605.56	.17
LOGGING COST ($/MBF)	34.46	44.44	36.31	761.37	142.86	5.36
MANUFACTURING COSTS ($/MBF)	39.78	38.90	41.01	40.93	36.89	1.11
NUMBER OF BIDDERS	4.38	3.93	5.64	29.33	6.72	4.36
FIBER (PERCENT)	0.00	3.93	0.00	151.03	101.07	1.49
SELLING VALUE ($/MBF)	119.56	112.30	106.86	1220.63	312.63	3.90
COMPETITIVE STATUS	1.95	1.85	1.94	.06	.09	.64
TERMINATION PERIOD (YEARS)	4.24	1.63	2.98	40.72	3.76	10.83

NOTES

1. NUMBER OF OBSERVATIONS ARE 21, 27, AND 50, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 2 AND 95 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 3.0921.

TABLE 54--RESULTS FOR SET ASIDE, SMALL OPEN AND LARGE OPEN ANALYSIS, REGION 5 ZONE 3

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS SET ASIDE	SM OPEN	LR OPEN	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	9.99	5.55	11.29	548.89	143.92	3.81
SALVAGE STATUS	1.81	1.51	1.73	1.02	.22	4.75
SALES VOLUME (MMBF)	8.43	2.58	7.29	429.96	43.13	9.97
MAJOR SPECIES (PERCENT)	21.87	27.59	23.53	349.30	620.77	.56
APPRAISED STUMPAGE ($/MBF)	11.09	16.65	15.27	191.86	208.40	.92
OVERBID ($/MBF)	27.70	19.75	29.97	1745.57	533.48	3.27
ROAD COSTS ($/MBF)	9.76	2.70	8.78	692.52	55.88	12.39
HAUL DISTANCE (MILES)	28.13	41.56	33.88	1531.85	909.00	1.69
LOGGING COST ($/MBF)	36.54	36.33	37.40	20.15	243.24	.08
MANUFACTURING COSTS ($/MBF)	43.17	35.29	42.21	889.69	201.57	4.41
NUMBER OF BIDDERS	5.56	4.65	5.59	15.14	8.04	1.88
FIBER (PERCENT)	0.00	1.87	1.54	21.72	106.95	.20
SELLING VALUE ($/MBF)	111.01	100.84	113.51	2691.75	1126.88	2.39
COMPETITIVE STATUS	1.94	1.84	1.89	.08	.11	.74
TERMINATION PERIOD (YEARS)	4.06	1.82	3.06	41.55	4.01	10.36

NOTES

1. NUMBER OF OBSERVATIONS ARE 16, 55, AND 82, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 2 AND 150 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 3.0563.

TABLE 55--RESULTS FOR SET ASIDE, SMALL OPEN AND LARGE OPEN ANALYSIS, REGION 6 ZONE 1

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS SET ASIDE	SM OPEN	LR OPEN	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	8.31	6.99	5.95	174.16	50.44	3.45
SALVAGE STATUS	1.90	1.68	1.79	1.25	.17	7.33
SALES VOLUME (MMBF)	6.41	4.07	7.00	380.68	31.87	11.94
MAJOR SPECIES (PERCENT)	33.14	41.75	54.77	16538.02	1326.90	12.46
APPRAISED STUMPAGE ($/MBF)	17.20	15.22	17.48	230.37	253.98	.91
OVERBID ($/MBF)	12.69	8.63	9.19	460.58	220.39	2.09
ROAD COSTS ($/MBF)	6.55	3.43	5.92	346.32	34.86	9.94
HAUL DISTANCE (MILES)	33.94	33.55	35.22	134.94	256.62	.53
LOGGING COST ($/MBF)	32.11	34.82	33.85	183.57	78.99	2.32
MANUFACTURING COSTS ($/MBF)	51.73	49.59	49.58	149.52	87.71	1.70
NUMBER OF BIDDERS	4.10	3.06	2.80	49.99	3.99	12.51
FIBER (PERCENT)	4.22	5.89	3.36	276.87	142.65	1.94
SELLING VALUE ($/MBF)	118.68	114.48	117.59	582.52	416.58	1.40
COMPETITIVE STATUS	1.72	1.53	1.53	1.22	.24	5.03
TERMINATION PERIOD (YEARS)	4.11	2.87	3.51	40.76	3.03	13.44

NOTES

1. NUMBER OF OBSERVATIONS ARE 79, 137, AND 234, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 2 AND 447 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 3.0152.

TABLE 56--RESULTS FOR SET ASIDE, SMALL OPEN AND LARGE OPEN ANALYSIS, REGION 6 ZONE 2

SALE CHARACTERISTICS AND UNITS	SAMPLE MEANS SET ASIDE	SM OPEN	LR OPEN	BETWEEN	WITHIN	F-RATIO
VOLUME/ACRE (MBF)	23.81	21.12	23.62	1036.65	418.80	2.48
SALVAGE STATUS	1.78	1.56	1.69	4.96	.22	22.80
SALES VOLUME (MMBF)	5.82	3.66	4.91	463.46	27.07	17.12
MAJOR SPECIES (PERCENT)	56.84	53.55	54.59	983.64	841.74	1.17
APPRAISED STUMPAGE ($/MBF)	32.75	31.62	30.82	338.53	402.08	.84
OVERBID ($/MBF)	31.85	34.21	41.08	9789.89	946.65	10.34
ROAD COSTS ($/MBF)	7.97	4.57	6.28	1093.50	63.47	17.23
HAUL DISTANCE (MILES)	42.00	38.70	38.33	1352.10	294.80	4.59
LOGGING COST ($/MBF)	38.12	40.56	39.26	573.94	150.15	3.82
MANUFACTURING COSTS ($/MBF)	55.26	53.96	57.16	1336.52	103.96	12.86
NUMBER OF BIDDERS	6.65	6.17	6.91	71.81	10.63	6.75
FIBER (PERCENT)	12.31	13.98	12.62	347.92	196.43	1.77
SELLING VALUE ($/MBF)	150.46	146.71	149.53	1634.09	610.74	2.68
COMPETITIVE STATUS	1.97	1.91	1.95	.36	.06	6.44
TERMINATION PERIOD (YEARS)	3.53	2.54	3.01	91.44	2.97	30.83

NOTES

1. NUMBER OF OBSERVATIONS ARE 278, 522, AND 517, RESPECTIVELY.
2. TO CONVERT STATUS VARIABLES TO PERCENT SUBTRACT THE REPORTED NUMBER FROM 2.0 AND MULTIPLY BY 100.0.
3. THE F VALUE FOR 2 AND 1314 DEGREES OF FREEDOM AND AT THE 5-PERCENT CONFIDENCE LEVEL IS 3.0015.

APPENDIX 2. CORRELATION COEFFICIENTS FOR EACH APPRAISAL ZONE

Tables 57-62

TABLE 57--CORRELATION COEFFICIENTS FOR REGION 1 ZONE 2

SALE CHARACTERISTICS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 VOLUME/ACRE	1.0000														
2 SALVAGE STATUS	-.9974	1.0000													
3 SET-ASIDE STATUS	-.9984	.9956	1.0000												
4 SALE VOLUME	.2396	-.2197	-.2393	1.0000											
5 MAJOR SPECIES	-.1410	.1466	.1413	-.0823	1.0000										
6 APPRAISED STUMPAGE	-.0790	.0679	.0961	-.3443	.0270	1.0000									
7 OVERRID	-.0325	.0325	.0383	-.0025	-.0061	.1296	1.0000								
8 ROAD COSTS	.1143	-.0902	-.1216	.4203	.0858	-.3412	-.1190	1.0000							
9 LOGGING COSTS	-.2113	.2153	.2083	.1217	-.0161	-.3482	-.1574	.1302	1.0000						
10 MANUFACTURING COSTS	-.2283	.2297	.2307	.0098	.0899	.0104	.2933	-.0624	.2490	1.0000					
11 NUMBER OF BIDDERS	-.0317	.0355	.0256	.1569	-.0206	-.0763	.6017	-.0124	-.1497	.2292	1.0000				
12 FIBER	.2474	-.2514	-.2457	.0355	-.2187	-.1599	-.1238	-.0927	-.1656	-.3538	-.0227	1.0000			
13 SELLING VALUE	-.4070	.4023	.4136	-.1951	.0904	.6246	.1369	-.0469	.1330	.4110	-.1074	-.3656	1.0000		
14 COMPETITIVE STATUS	-.0461	.0408	.0438	-.0971	-.0693	-.0266	-.1515	-.1055	-.1764	-.1311	-.0130	.0686	-.0525	1.0000	
15 TERMINATION PERIOD	.0559	-.0546	-.0534	.1201	.1274	.0925	.0714	.0955	.1268	.0981	-.0157	-.1206	.0790	-.8029	1.0000

TABLE 58--CORRELATION COEFFICIENTS FOR REGION 5 ZONE 1

SALE CHARACTERISTICS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 VOLUME/ACRE	1.0000														
2 SALVAGE STATUS	-.9992	1.0000													
3 SET-ASIDE STATUS	-.9993	.9983	1.0000												
4 SALE VOLUME	.1527	-.1396	-.1527	1.0000											
5 MAJOR SPECIES	.0551	-.0528	-.0591	-.0710	1.0000										
6 APPRAISED STUMPAGE	.0996	-.1058	-.0964	-.2326	.1292	1.0000									
7 OVERRID	.0711	-.0694	-.0737	.1651	.0534	-.0567	1.0000								
8 ROAD COSTS	-.1081	.1242	.1121	.4292	.0426	-.3282	-.0425	1.0000							
9 LOGGING COSTS	-.1029	.1039	.1021	-.0938	.1986	-.3311	-.0575	-.0189	1.0000						
10 MANUFACTURING COSTS	.0422	-.0328	-.0490	.1272	.0498	-.1932	.1607	.1862	.2756	1.0000					
11 NUMBER OF BIDDERS	.1359	-.1268	-.1397	.4118	.1373	-.2514	.6704	.1988	.0477	.1870	1.0000				
12 FIBER	-.0586	.0511	.0597	.0269	-.0607	-.0211	.0036	-.0773	-.0038	-.0562	.0492	1.0000			
13 SELLING VALUE	-.3666	.3698	.3638	-.0938	.1962	.5432	-.0425	.1667	.2268	.3542	-.1157	-.0418	1.0000		
14 COMPETITIVE STATUS	-.0610	.0650	.0466	.1157	.0308	.0231	-.2493	.0889	-.1405	-.1556	-.1591	-.0770	.0010	1.0000	
15 TERMINATION PERIOD	.0730	-.0800	-.0624	-.0816	-.0506	.0816	.1219	-.0751	.1250	.0477	.0461	.1039	.0553	-.7989	1.0000

TABLE 59--CORRELATION COEFFICIENTS FOR REGION 5 ZONE 2

SALE CHARACTERISTICS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 VOLUME/ACRE	1.0000														
2 SALVAGE STATUS	-.9964	1.0000													
3 SET-ASIDE STATUS	-.9966	.9914	1.0000												
4 SALE VOLUME	.5120	-.4976	-.5164	1.0000											
5 MAJOR SPECIES	.0775	-.0759	-.0763	.1472	1.0000										
6 APPRAISED STUMPAGE	.0102	-.0140	-.0299	-.0459	-.2013	1.0000									
7 OVERBID	.0316	-.0253	-.0174	.2212	-.1955	-.2342	1.0000								
8 ROAD COSTS	.1219	-.0843	-.1372	.3528	-.0035	-.2226	.1789	1.0000							
9 LOGGING COSTS	.1963	-.1947	-.1805	-.0905	-.0663	-.4950	-.0952	-.1120	1.0000						
10 MANUFACTURING COSTS	.1332	-.1212	-.1285	.2199	-.0936	-.2407	.2394	.1702	.2712	1.0000					
11 NUMBER OF BIDDERS	.0984	-.0814	-.0886	.3981	-.0398	-.2310	.7323	.3445	-.1731	.2022	1.0000				
12 FIBER	-.0617	.0471	.0655	-.0698	-.0556	-.0927	-.1158	-.0904	.2498	.0264	-.1123	1.0000			
13 SELLING VALUE	-.0157	.0298	-.0025	-.0633	-.4181	.5883	-.1598	.0903	.1568	.3225	-.2194	.1039	1.0000		
14 COMPETITIVE STATUS	.3756	-.3775	-.4068	.2742	.0879	.0380	-.1002	-.0191	.0547	-.1023	-.0351	.1564	-.0226	1.0000	
15 TERMINATION PERIOD	-.2924	.2835	.3059	-.1982	.0143	.1520	.0176	-.0499	-.1975	-.0274	-.1256	-.1309	.0349	-.7620	1.0000

TABLE 60--CORRELATION COEFFICIENTS FOR REGION 5 ZONE 3

SALE CHARACTERISTICS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 VOLUME/ACRE	1.0000														
2 SALVAGE STATUS	-.9992	1.0000													
3 SET-ASIDE STATUS	-.9997	.9988	1.0000												
4 SALE VOLUME	-.0934	.1142	.0899	1.0000											
5 MAJOR SPECIES	-.2671	.2796	.2679	.1241	1.0000										
6 APPRAISED STUMPAGE	.3383	-.3467	-.3354	-.3356	-.1274	1.0000									
7 OVERBID	.1428	-.1449	-.1433	.0232	-.1412	-.1084	1.0000								
8 ROAD COSTS	-.1864	.2069	.1829	.5552	.0505	-.4244	.0809	1.0000							
9 LOGGING COSTS	-.2693	.2715	.2693	.0719	.3334	-.1953	.1728	.0981	1.0000						
10 MANUFACTURING COSTS	-.0101	.0133	.0081	.1550	.1850	-.0451	.3825	.1249	.6982	1.0000					
11 NUMBER OF BIDDERS	.0950	-.0880	-.0958	.2195	-.0359	-.3271	.6303	.1661	-.1028	.1159	1.0000				
12 FIBER	-.1015	.0935	.1026	-.1150	.1659	.0238	.2857	-.0986	.5980	.5723	-.0799	1.0000			
13 SELLING VALUE	-.3597	.3627	.3590	.1026	.2859	.1459	.1782	.1906	.8140	.7987	-.1456	.5640	1.0000		
14 COMPETITIVE STATUS	.1287	-.1220	-.1370	.0915	-.0973	-.0714	.0254	.1514	-.0791	-.0012	.0931	-.0955	-.0736	1.0000	
15 TERMINATION PERIOD	.0419	-.0473	-.0370	-.1001	.0718	.1995	-.1473	-.1597	.0590	-.0603	-.2568	.1534	.0344	-.7620	1.0000

TABLE 61--CORRELATION COEFFICIENTS FOR REGION 6 ZONE 1

SALE CHARACTERISTICS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 VOLUME/ACRE	1.0000														
2 SALVAGE STATUS	-.9985	1.0000													
3 SET-ASIDE STATUS	-.9986	.9968	1.0000												
4 SALE VOLUME	.1975	-.1740	-.1978	1.0000											
5 MAJOR SPECIES	-.3303	.3275	.3371	.1420	1.0000										
6 APPRAISED STUMPAGE	.0405	-.0444	-.0411	-.0443	.3318	1.0000									
7 OVERBID	.2595	-.2591	-.2626	.0850	-.0299	-.0374	1.0000								
8 ROAD COSTS	.0839	-.0539	-.0885	.4573	-.0281	-.1949	.0023	1.0000							
9 LOGGING COSTS	-.1583	.1612	.1618	-.0440	-.2048	-.4480	-.1823	.0462	1.0000						
10 MANUFACTURING COSTS	.1121	-.1110	-.1159	.1105	.0706	-.1606	.1126	.1123	.2066	1.0000					
11 NUMBER OF BIDDERS	.3520	-.3501	-.3613	.1065	-.1382	-.0542	.6236	.1145	-.1825	.1673	1.0000				
12 FIBER	-.0339	.0197	.0338	-.1179	-.0949	-.0600	-.0006	-.1044	-.1079	-.3058	.0232	1.0000			
13 SELLING VALUE	-.3160	.3189	.3135	.0437	.4088	.5793	-.1191	.0863	.1172	.4415	-.1134	-.2704	1.0000		
14 COMPETITIVE STATUS	-.0131	.0216	.0021	.0114	-.0090	-.1365	-.0788	.0965	.0268	.1081	.0266	-.0917	.0122	1.0000	
15 TERMINATION PERIOD	-.0372	.0315	.0437	-.0195	-.0068	.2677	-.0686	-.0578	-.0035	-.2302	-.1029	.0487	.0934	-.7322	1.0000

TABLE 62--CORRELATION COEFFICIENTS FOR REGION 6 ZONE 2

SALE CHARACTERISTICS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 VOLUME/ACRE	1.0000														
2 SALVAGE STATUS	-.9998	1.0000													
3 SET-ASIDE STATUS	-.9998	.9995	1.0000												
4 SALE VOLUME	.3501	-.3420	-.3522	1.0000											
5 MAJOR SPECIES	-.0841	.0847	.0832	-.0093	1.0000										
6 APPRAISED STUMPAGE	.0874	-.0887	-.0879	-.1227	.2255	1.0000									
7 OVERBID	.1273	-.1223	-.1257	.2528	.1090	.0821	1.0000								
8 ROAD COSTS	.1563	-.1476	-.1587	.4213	.0983	-.3581	.1287	1.0000							
9 LOGGING COSTS	-.3533	.3520	.3542	-.2194	.1066	-.3411	.0011	-.1058	1.0000						
10 MANUFACTURING COSTS	-.0750	.0763	.0751	.0429	.4759	.0533	.1831	.0733	.1352	1.0000					
11 NUMBER OF BIDDERS	.2184	-.2134	-.2185	.4651	.0269	-.0624	.4747	.2772	-.2749	.1359	1.0000				
12 FIBER	.0466	-.0498	-.0460	.0078	-.2558	-.1665	-.0996	-.0777	-.2318	-.2440	.0094	1.0000			
13 SELLING VALUE	-.6776	.6795	.6768	-.2693	.4366	.4215	.0835	-.0979	.3978	.4684	-.1643	-.3403	1.0000		
14 COMPETITIVE STATUS	.0471	-.0458	-.0501	.0700	.0052	.0118	-.0424	.1110	-.0357	-.1268	.0317	.0016	-.0337	1.0000	
15 TERMINATION PERIOD	-.0540	.0529	.0543	-.0735	-.0232	.1327	-.0250	-.1131	.0258	.0240	-.1026	.0119	.1036	-.7550	1.0000

APPENDIX 3. THE USE OF THE CHOW TEST FOR STRUCTURAL SHIFTS

A procedure proposed by Chow (1960) was used to test whether a structural shift had taken place in the relationship between overbid and various sale characteristics. The Chow test was selected because the number of independent variables exceeds the number of observations in the second data set. Using Johnston's (1972) interpretation of the procedure, I fitted equation 3 to the first n observations using linear regression and computed the residual sum of squares ($e_1'e_1$). Then the n+m sample observations were pooled and a second least squares regression was fitted. The residual sum of squares ($e'e$) was computed for the second regression. The test of the null hypothesis--that the m additional observations obey the same relation as the first--is given by the equation,

$$F = ((e'e - e_1'e_1)/m)/(e_1'e_1/(n - k)); \qquad (8)$$

where k is the number of independent variables in the linear regression equation. The test statistic follows the F distribution with (m, n-k) degrees of freedom.

The appropriate test values for the various regions and zones are as follows:

Region	Zone	n	$e_1'e_1$	m	n+m	e'e	k	n-k	Computed F	Test value
5	1	24	1,106	12	36	1,720	14	10	0.463	2.76
6	1	24	357	12	36	639	14	10	.658	2.76
1	2	24	125	12	36	438	14	10	2.090	2.76
5	2	22	283	9	31	986	14	8	2.208	2.85
6	2	24	356	12	36	786	14	10	1.006	2.76
5	3	22	664	12	34	2,101	14	8	1.443	2.76

APPENDIX 4. PROCEDURE FOR TESTING THE HYPOTHESIS THAT THERE IS NO DIFFERENCE BETWEEN SET-ASIDE AND OPEN SALES

Discriminant analysis was used in a manner analogous to a one-way multivariate analysis of variance. The U-statistic (Kramer 1972) was used as the appropriate test statistic. In this case, discriminant analysis is used to study the differences in the two groups of sales as expressed by the linear combination of sale characteristics. The estimated coefficients for each sale characteristic can be interpreted as weights in the same way that the coefficients are in multiple regression. In this respect, they serve to identify the variables that contribute most to differentiation between the two groups.

As described in the text, discriminant analysis assumes independence among explanatory variables. In practice, the technique is very robust, and the assumption of independence need not be strongly adhered to.

In the case of testing for differences between characteristics of set-aside and open sales, most of the possible explanatory variables are sufficiently independent, with the exception of appraised stumpage price. This variable is computed as a combination of the selling value and cost components determined for each sale. As such, the correlation coefficients between appraised stumpage and the components are relatively high. A possible solution would be to drop appraised stumpage price as a sale characteristic, but it was retained since it is a relatively insignificant variable in terms of the discriminant functions.

The discriminant functions are shown in the following tabulation where Z_1 is the function for set-aside sales and Z_2 is the function for open sales.

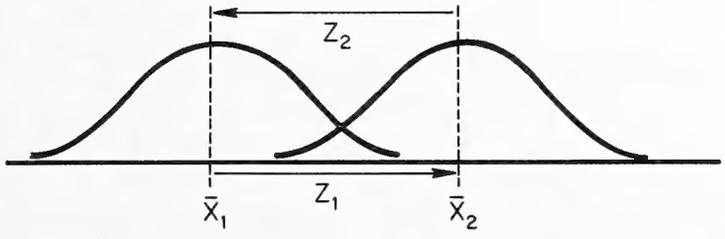
The discriminant functions were computed by a stepwise procedure, in which the variables that enter are those with the largest F values. A variable is deleted if the F value becomes too low (0.01). The U-statistic was computed for each discriminant function, and the null hypothesis is rejected if the sample U is less than the test value.

	Region 1	Zone 2	Region 5	Zone 1	Region 5	Zone 2
	Z_1	Z_2	Z_1	Z_2	Z_1	Z_2
Volume per acre	0.618	0.590	-0.099	-0.135	-0.520	-0.507
Salvage status	9.460	9.709	16.934	17.713	6.595	6.430
Volume	-.170	-.050	-.080	.100	-.680	-.480
Major species	.022	.028	-.035	-.062		
Appraised stumpage	.067	.045	-.074	-.016	-.012	-.140
Road costs	.017	-.026	-.220	-.195	-.547	-.519
Haul distance	.035	.042	.093	.100	-.001	.009
Logging cost	.406	.384	.103	.178	-.017	.049
Manufacturing cost	.898	.888	.526	.473	.884	.921
Fiber						
Selling value	.113	.143	.257	.216	.309	.236
Termination period	-.173	-.536	.124	-.747	3.746	2.619
Constant	48.058	-49.408	-42.246	-38.353	-43.366	-37.582
U-statistic	.939		.874		.719	
Test U-statistic	.952		.930		.850	

	Region 5	Zone 3	Region 6	Zone 1	Region 6	Zone 2
	Z_1	Z_2	Z_1	Z_2	Z_1	Z_2
Volume per acre	0.020	0.013	0.128	0.151	0.077	0.083
Salvage status	10.553	11.064			8.480	8.236
Volume	-.140	-.050	-.560	-.440	-.320	-.300
Major species	-.049	-.039	-.005	-.024	-.059	-.064
Appraised stumpage	.261	.314	.178	.162	-.308	-.323
Road costs	.057	.129			-.377	-.405
Haul distance	.038	.052	.128	.121	.065	.052
Logging cost	.238	.310	.446	.496		
Manufacturing cost	.289	.280	.587	.528	.080	.084
Fiber			.291	.279	.367	.368
Selling value	-.125	-.156	.089	.091	.512	.518
Termination period	.032	.769	2.825	2.198	1.316	1.075
Constant	-14.512	-14.207	-36.577	-34.279	-45.961	-44.730
U-statistic	.907		.878		.950	
Test U-statistic	.899		.965		.984	

APPENDIX 5. THE USE OF DISCRIMINANT FUNCTIONS TO MONITOR SALES

Discriminant functions were estimated for both competitive and noncompetitive sales. The definition of competitive sales was given in the section, "Definitions and Available Data." The objective was to estimate functions that combined various physical and cost characteristics observed on each sale and were effective in distinguishing between competitive and noncompetitive sales. The basic problem can be visualized as studying the extent to which different populations overlap one another or diverge from one another. For example, visualize two slightly overlapping populations shown as follows:



In this case, the leftmost population will represent noncompetitive sales, the rightmost competitive sales. Given that the sales have been classified a priori, a linear function (the discriminant function) is estimated for each population which measures the distance (Z) between the two population means ($\bar{X}$). These equations are:

$$Z_1 = \gamma_{11} + \sum_{i=2}^{n} \gamma_{1i} X_{1i-1}; \quad (9)$$

$$Z_2 = \gamma_{21} + \sum_{i=2}^{n} \gamma_{2i} X_{2i-1}; \quad (10)$$

where

Z is the distance between population means,
γ_{j1} is the intercept term for the j^{th} population, and
γ_{ji} is the coefficient for population characteristic X_i of the j^{th} population.

The estimated discriminant functions are then used to classify all sales as either competitive or noncompetitive, regardless of the a priori classification, based on the characteristics of each sale. The classification procedure is relatively straightforward. For each sale, the Z values are computed using each discriminant function. In this case, if Z_1 is greater than Z_2, then the sale is classified as having the characteristics of a noncompetitive sale. Reverse the sequence and the sale is classified as competitive in the sense that the characteristics of the particular sale are similar to sales comprising the population of competitive sales.

The estimated discriminant functions are shown in the following tabulation on the next page.

Sale characteristics	Region 1 Zone 2 Z_1	Z_2	Region 5 Zone 1 Z_1	Z_2	Region 5 Zone 2 Z_1	Z_2
Volume per acre (MBF)	0.62129	0.68173	0.03855	-0.05611	-0.53047	-0.60492
Salvage status	9.74950	9.29289	18.75354	17.06144	8.07441	4.49807
SBA status	16.36478	16.83769	31.84067	30.24422	20.55825	18.56831
Sales volume (MBF)	-.00021	-.00025	-.00022	-.00030	-.00079	-.00103
Major species (percent)	.05937	.04451	.01392	-.01590	.13359	.15224
Appraised stumpage ($/MBF)	.12634	.10785	.05310	-.08453	.01397	-.32176
Overbid ($/MBF)	-.38765	-.25130	-.03981	-.00457	-.12257	-.06231
Road costs ($/MBF)	.17043	.11196	.01209	-.18101	-.66490	-.91749
Haul distance (miles)	.00437	.00989	.06897	.08848	-.00107	-.00743
Logging costs ($/MBF)	.52111	.49631	.15571	.05444	-.06196	-.25358
Manufacturing costs ($/MBF)	1.00665	.93885	.78909	.59930	.75846	.51419
Number of bidders	2.27453	2.75349	-.12405	.46883	.97747	1.62718
Fiber (percent)	.23055	.24514	.30550	.29236	-.04567	-.05566
Selling value ($/MBF)	.14722	.21308	.14656	.27385	.44824	.72447
Termination period (years)	-.62457	-.67182	.25745	.78312	3.84303	4.83871
Constant	-72.60328	-77.10054	-76.56212	-71.76233	-67.65229	-67.11818

Sale characteristics	Region 5 Zone 3 Z_1	Z_2	Region 6 Zone 1 Z_1	Z_2	Region 6 Zone 2 Z_1	Z_2
Volume per acre (MBF)	0.08755	0.01696	-0.17221	-0.22432	0.07460	0.07622
Salvage status	14.36894	9.04530	15.16427	14.98504	10.37391	9.40501
SBA status	21.30913	21.57700	16.65939	16.32758	13.90379	12.92309
Sales volume (MBF)	-.00008	-.00023	-.00055	-.00059	-.00024	-.00039
Major species (percent)	-.07368	-.05615	-.00336	-.00530	-.03476	-.04852
Appraised stumpage ($/MBF)	.42069	.27744	.10329	.09394	.33077	.32174
Overbid ($/MBF)	-.12051	-.04478	-.03412	.05540	-.14001	-.10920
Road costs ($/MBF)	.29099	.04602	-.30428	-.33174	.23396	.21608
Haul distance (miles)	.03197	.02931	.20050	.20659	.08846	.09654
Logging costs ($/MBF)	.46477	.28304	.34772	.33246	.64652	.61374
Manufacturing costs ($/MBF)	.37317	2.29143	.45548	.42587	.53529	.59225
Number of bidders	.58689	.91873	1.07349	1.63944	.56231	1.00864
Fiber (Percent)	-.15713	-.18169	1/	1/	.35083	.35360
Selling value ($/MBF)	-.20298	-.09187	.12466	.14836	1/	1/
Termination period (years)	-1.32466	.41886	1.05823	1.21181	.84711	1.28949
Constant	-42.93132	-37.66939	-57.52810	-59.56042	-59.26485	-59.77977

1/ This variable was deleted because its impact on the sum of squares was insufficient.

GPO 990-094

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