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United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-277087

June 17, 1997

The Honorable John R. Kasich
Chairman, Committee on the Budget
House of Representatives

Subject: Forest Service: Factors Affecting Bids on Timber Sales

Dear Mr. Chairman:

As agreed with your office, we are providing you with information on the factors that affect bid premiums for the Forest Service's timber sales. Our objectives were to (1) identify what are the key factors related to bid premiums in these sales, (2) determine what effects the key factors have on bid premiums, (3) determine if there are any regional differences in the key factors, and (4) determine what other factors could affect bid premiums that might not be evident in the Forest Service's timber sales reports. These issues are discussed below and in enclosure I. Because a centralized database was not available, we sampled the agency's timber sales reports for all Forest Service regions except Alaska. We performed statistical analyses on the data contained in the reports to determine the factors related to bid premiums and their relative importance.

According to the Forest Service, its regions, excluding Alaska, sold approximately $2.6 billion worth of timber in reportable sales in fiscal years (FY) 1992-96. We analyzed reports from this period that we estimate totaled about $2.47 billion in sales. For those sales, we found that the appraised prices before bidding began totaled approximately $1.8 billion. The overall bid premium expressed as a bid ratio (the ratio of winning bid price to appraised price) was 1.45. Approximately 59 percent of the sales analyzed sold for less than $100,000. About 8 percent of the sales sold for $700,000 or more.

SUMMARY

We found three factors that were significantly and positively related to higher bid premiums (the amount that the winning bidder paid over the appraised price).[1] One of these factors, the use of sealed bids, could have increased timber sales receipts by $56 million if it had occurred in place of some oral auctions.

- The number of bidders per sale has a significant relationship with bid premiums. Regions 5 (Pacific Southwest) and 6 (Pacific Northwest) had the highest number of bidders per sale and had the highest bid premiums. Region 5 averaged about 2.97 bidders per sale and had a bid ratio of about 1.70. Region 6 averaged about 3.05 bidders per sale and had a bid ratio of about 1.68. Regions 3 (Southwestern) and 4 (Intermountain) were among the three regions that averaged less than 2 bidders per sale and had the lowest bid premiums. Region 3 averaged about 1.59 bidders per sale and a bid ratio of about 1.17. Region 4 averaged about 1.78 bidders per sale and a bid ratio of about 1.17. Since the number of bidders was a key factor associated with higher bid premiums, we examined the factors that increased the number of bidders. One factor, the amount by which the estimated price of the timber being offered for sale is reduced (known as the rollback), was significantly related to the number of bidders. Regions 5 and 6 had relatively large rollbacks and the greatest estimated number of bidders per sale. Regions 2 (Rocky Mountain), 3, and 4 had relatively small rollbacks and the lowest estimated number of bidders per sale. Forest Service officials noted, however, that at some point, if there are not many bidders, the Service begins reducing the rollbacks, since they are not serving the intended purpose. They believe this practice may account for the results in Regions 2 and 3.

- The sealed bid auction method was significantly related to higher bid premiums. In sealed bid sales, individual bidders do not know how many bidders they are bidding against. Consequently, the bidders must assess the likelihood of competing bidders and base their bid accordingly. On the other hand, in oral auction sales, the bidders know if anyone else is competing against them. As a result, a single bidder at an oral auction can

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[1]See Federal Timber Sales: Process for Appraising Timber Offered for Sale Needs to Be Improved (GAO/RCED-90-135, May 2, 1990) for a description of our model, which determined statistical relationships by applying our sample data to a model of overbid percentages.

win the sale by bidding the Forest Service's appraised price. The appraised price is determined by rolling back the estimated value of the timber by some factor to encourage more bidders and adjust for possible inadequacies in the estimate, including timber market conditions. In effect, the bidder gets the timber at a discount from the Forest Service's estimated value of the timber. The advantage gained at an oral auction by a single bidder over bidders at any other sale is shown by the difference in the bid ratio. In sales in which there is only one bidder (29.4 percent of the sales analyzed), the bid ratio is 1.01 for oral auction sales compared with 1.14 for sealed bid sales. If the oral auction, single-bidder sales had been sealed bid sales, we estimate that revenues from these sales could have been $56 million higher.

- Salvage sales, which generally contain dead or dying trees, appear to have a significant relationship with bid premiums. However, that occurs, in part, because some regions reduce the estimated value of salvage timber by a greater amount than normal when determining the appraised price in order to spur sales. This action can result in higher bid premiums when a salvage sale tree sells at the same price as a green sale tree. About 60 percent of salvage sales were less than $50,000, while about 36 percent of green sales were less than $50,000.

The factors that related to more bidders and higher bid premiums varied across regions. In Regions 5 and 6, the factors related to more bidders and higher bid premiums were higher, on average, than the national estimates. Regions 5 and 6 had the highest average number of bidders and bid premiums of the regions. In Regions 3 and 4, the factors related to the number of bidders and bid premiums were lower, on average, than the national estimates. Regions 3 and 4 had the fewest average number of bidders and the lowest average bid premiums. Tables II.1 and II.2 in enclosure II show all estimates and sampling errors for all regions on the factors related to the number of bidders and the amount of bid premium.

We spoke with Forest Service headquarters, regional, and forest-level personnel; industry sources; and timber experts to obtain their views on other possible factors not included in timber sale reports that might affect bid premiums and the number of bidders. They identified three major areas:

- Species protection and changes in forest management philosophy. These factors have reduced the allowable size of harvested trees and increased the use of more costly harvesting practices, such as the use of helicopters to reduce environmental damage. Also, management philosophies requiring

more intensive timber management activities by loggers, such as replanting understocked stands or thinning to reduce fire danger, have increased logging costs, resulting in lowered value to the bidder.

- Concentration in the timber industry. In some areas, there are fewer mills operating than previously, giving those closest to the sales a cost advantage over more distant mills. Unless the value of the trees is high enough to offset the disadvantage of distance, this factor could lead to fewer bidders. There are also fewer mills to buy logs from the independent loggers who might be interested in bidding on the sale.

- Use of the transaction evidence appraisal (TEA) method. TEA uses past sales as the starting point for timber appraisals. Because prior sales are used as the basis for the appraisal, TEA may be slow to reflect price decreases in declining timber markets. If the appraisal overvalues the proposed sale, there is a likelihood that no one will bid on the sale. Forest Service officials believe this is true for any appraisal system that relies on existing data, not just TEA.

AGENCY COMMENTS

We provided the Forest Service with a draft of this report for review and comment. We met with the Deputy Director, Timber Management Staff, and members of his staff at Forest Service headquarters. They agreed with the information presented in our report and provided us with clarifications, which we have incorporated where applicable.

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We performed our work from January 1997 through May 1997 in accordance with generally accepted government auditing standards. We reviewed journal articles, industry reports, reports by the U.S. Department of Agriculture's Office of Inspector General and prior GAO reports to discover what factors were previously found to be important in timber sales. Because data tapes recording timber sale data were not available, we sampled the Forest Service's Reports of Timber Sales from fiscal years 1992 through 1996 for all Forest Service regions except Alaska. The Forest Service files reports only for sales that are for at least 2 million board feet or more than $2,000; however, such sales account for most of the timber sold. We briefed your office on the

results of our work on May 21, 1997. Please call me on (206) 287-4810 if you or your staff have any questions. Major contributors to this report were Edward M. Zadjura, Jonathan Bachman, and SaraAnn Moessbauer.

Sincerely yours,

James K. Meissner
Associate Director, Energy, Resources,
and Science Issues

Enclosures-2

GAO Resources, Community, and Economic Development Division

REVIEW OF FACTORS AFFECTING BIDS ON FOREST SERVICE TIMBER SALES

ENCLOSURE I

GAO Timber Sales Competition - Objectives

- What are the key factors related to bid premiums in Forest Service timber sales?
- What effects do the key factors have on bid premiums?
- Are there regional differences in the key factors?
- What other factors could affect bid premiums that might not be evident in sales reports?

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Timber Sales Competition - Scope and Methodology

- Reviewed journal articles, industry reports, USDA OIG and GAO reports
- Discussed our work with Forest Service, CRS, and CBO personnel
- Sampled reports of timber sales from FYs 1992-96 for all regions except Alaska because Forest Service did not have a computerized database available with sales data

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Timber Sales Competition - Scope and Methodology

- Performed statistical analyses on data in the reports to determine factors related to increased bid premiums

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Timber Sales Competition - Scope and Methodology

- Regression analyses
  - Performed on a national level
  - Examined impact of each factor in determining bid premiums and number of bidders
  - Controlled for the impact of other factors when examining relationships

GAO

Timber Sales Competition - Background

- During FYs 1992-96, Forest Service Regions 1-9 sold about $2.6 billion in timber
- GAO analyzed a sample of the large sales that occurred during this period
  - The estimated total sales represented by the sample was about $2.47 billion

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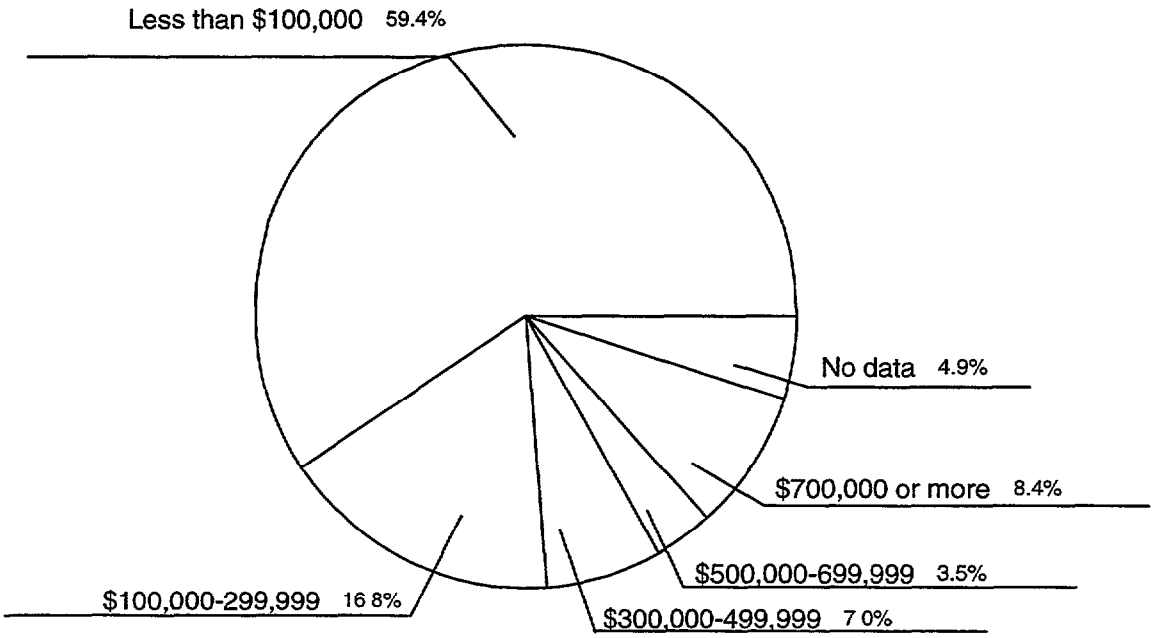
Timber Sales Competition - Background

- Of the sales GAO analyzed:
  - The appraised prices before bidding began totaled about $1.8 billion
  - The overall bid ratio (the ratio of bid to appraised prices) was about 1.45
  - The bid ratio is based on data from sales in which both winning bid price and appraised price were reported

GAO Timber Sales Competition - Background

Distribution of Timber Sales Selling Prices



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Timber Sales Competition - Factors Related to Higher Premiums

- National-level regression results
  - Three factors had significant and positive impact on higher bid premiums
    - Use of sealed bids--about 75% of all sales used sealed bids
    - Number of bidders--the average number of bidders was about 2.66
    - Salvage sales--about 42% of all sale

Note· Table II.1 lists significant factors affecting bid premiums, by region, with their sampling errors.

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Timber Sales Competition - Factors Related to Higher Premiums

Average impact of factors on winning bid price

• Increase in number of oral bidders	Increase in amount bid
• From 2 to 3 bidders	+ 8.5 %
• From 3 to 4 bidders	+ 3.9 %
• From 4 to 5 bidders	+ 2.3 %

Note: Sales with only 1 bidder not included in our analysis of oral bid sales because single bidders have no reason to bid above the minimum advertised price since they know there are no other bidders.

• Increase in number of sealed bidders	Increase in amount bid
• From 1 to 2 bidders	+ 38.2 %
• From 2 to 3 bidders	+ 9.2 %
• From 3 to 4 bidders	+ 4.2 %
• From 4 to 5 bidders	+ 2.4 %
• Change from oral to sealed bid sale	+ 8.6 %
• Change from green to salvage sale	+17.1 %

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Timber Sales Competition - Factors Related to Higher Premiums

- Regions 5 and 6 averaged the highest number of bidders per sale and the highest bid premiums
  - Region 5 averaged about 2.97 bidders per sale and had a bid ratio of about 1.70
  - Region 6 averaged about 3.05 bidders per sale and had a bid ratio of about 1.68

ENCLOSURE I

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Timber Sales Competition - Factors Related to Higher Premiums

- Regions 3 and 4 averaged among the lowest number of bidders per sale and had the lowest bid premiums
  - Region 3 averaged about 1.59 bidders per sale and had a bid ratio of about 1.17
  - Region 4 averaged about 1.78 bidders per sale and had a bid ratio of about 1.17

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Timber Sales Competition - Factors Related to Higher Premiums

- In sealed bid sales, individual bidders do not know how many other bidders they are competing against
- In cases with a single bidder (29.4% of all sales), sealed bid sales had an overall bid ratio of 1.14, while oral auction sales had an overall bid ratio of 1.01

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Timber Sales Competition - Factors Related to Higher Premiums

- If these same single-bidder oral auctions had been single-bidder sealed bid sales, we estimate that sales revenue could have been about $56 million more

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Timber Sales Competition - Factors Related to Higher Premiums

- While salvage sales had a significant impact on bid premiums, that occurs, in part, because some regions reduce the estimated value of the timber by a greater amount than normal when determining the appraised price for salvage sales to spur bidding
- Numerically, salvage sales represented about 42% of all sales and 32% of the total dollar value

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Timber Sales Competition - Factors Related to More Bidders

- Since the number of bidders was a key factor that cut across all other factors, such as the type of sale (green vs salvage) or the method of sale (oral vs sealed bid), we examined the factors that increased the number of bidders
- There were 6 factors that increased the number of bidders at the national level

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Timber Sales Competition - Factors Related to More Bidders

- These factors relate to either sale administration or sale contents

Note: Table II.2 lists significant factors, by region, with their sampling errors.

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Timber Sales Competition - Factors Related to More Bidders

- Administrative factors
  - Amount of rollback
  - Sealed bids
  - Purchaser road credits

Note: A rollback is a reduction in the estimated value of timber to calculate the appraised price for the sale. The rollback is intended to encourage more bidders to participate in the sale.

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Timber Sales Competition - Factors Related to More Bidders

- Content factors
  - Sale volume
  - Salvage sale
  - Quality of the trees (measured by the appraised price per thousand board feet)

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Timber Sales Competition - Factors Related to More Bidders

- Rollback had a significant impact on the number of bidders

Note: Rollbacks could not be calculated for Region 1 sales because of the methodology used to establish rollbacks in that region. This precluded the use of Region 1 in any analysis involving rollbacks or appraised prices.

- Regions 5 and 6 had relatively large rollbacks and the highest number of bidders per sale
- Regions 2, 3, and 4 had relatively small rollbacks and the lowest number of bidders per sale

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Timber Sales Competition - Variations Among Regions

- There were regional variations in the 6 factors that related to more bidders
  - Regions 5 and 6 almost always had higher average values for the factors positively related to higher bid premiums and more bidders than the national averages
    - Regions 5 and 6 had the highest bid ratios and the most bidders

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Timber Sales Competition - Variations Among Regions

- Regions 3 and 4 usually had lower average values for the factors positively related to higher bid premiums and more bidders than the national scores
  - Regions 3 and 4 had the lowest bid ratios and among the fewest bidders

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Timber Sales Competition - Other Factors Affecting Bid Premiums

- Forest Service and other knowledgeable parties have cited other factors as potentially affecting bid premiums and the number of bidders
  - Species protection and changes in forest management philosophy
  - Concentration in the timber industry
  - Use of transaction evidence appraisal (TEA) method in declining markets

ENCLOSURE I

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Timber Sales Competition - Other Factors Affecting Bid Premiums

- Species protection and changes in forest management philosophy
  - Have reduced size of trees being harvested
  - Have changed logging practices to include more costly harvesting methods
  - Have reduced value of federal timber to potential bidders

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Timber Sales Competition - Other Factors Affecting Bid Premiums

- Concentration in the industry
  - With fewer mills, those that are closest to sales have distinct cost advantages over those farther away, which may reduce the number of bidders
  - Bidders planning on selling to mills have fewer options, leaving less room for differences in bids

ENCLOSURE I

GAO Timber Sales Competition - Other Factors Affecting Bid Premiums

- TEA method
  - Because the TEA method of appraising timber sales is based on past sales, its results may be slow to reflect price decreases in a declining market
  - Consequently, the amount of rollback may be a significant factor in bringing in bidders
    - Only areas with higher rollbacks may have prices low enough to attract bidders

SIGNIFICANT FACTORS RELATED TO HIGHER BID PREMIUMS AND NUMBER OF BIDDERS

Table II.1: Significant Factors Related to Higher Bid Premiums

			Significant factors		
	Number of sales	Overall bid ratio	Average number of bidders	Percent sealed bids	Percent salvage sales
Total U.S.	10,423 (±197)	1.45(±.06)	2.7 (±.1)	75.1 (±1.2)	42.2 (±2.3)
Region 1	1145 (±78)	1.58 (±.21)	2.5 (±.2)	47.5 (±6.2)	58.4 (±5.9)
Region 2	432 (±18)	1.29 (±.07)	1.7 (±.1)	90.9 (±3.3)	40.1 (±5.3)
Region 3[1]	180 (±0)	1.17 (±0)	1.6 (±0)	31.9 (±0)	27.2 (±0)
Region 4	632 (±37)	1.17 (±.07)	1.8 (±.2)	35.3 (±5.7)	60.1 (±5.6)
Region 5	1162 (±84)	1.70 (±.24)	3.0 (±.3)	85.1 (±4.5)	70.4 (±5.7)
Region 6	1472 (±65)	1.68 (±.18)	3.0 (±.3)	15.4 (±3.9)	57.1(±5.5)
Region 8	3546 (±117)	1.31 (±.05)	2.7 (±.2)	100.0 (±0)	30.2 (±4.8)
Region 9	1854 (±79)	1.34 (±.06)	2.8 (±.2)	100.0 (±0)	14.5 (±4.5)

Note: Sampling errors are in parentheses.

[1]All sales for Region 3 were sampled.

Table II.2: Significant Factors Related to Higher Number of Bidders

		Significant factors					
	Average number of bidders	Average percent rollback	Average sale volume (mbf)	Percent sealed bids	Percent salvage sales	Average quality (appraised value/mbf)	Percent including road credits
Total U.S.	2.7 (±.1)	15.3 (±0.2)	1418.8 (±90.3)	75.1 (±1.2)	42.2 (±2.3)	143.0 (±6.6)	30.3 (±2.3)
Region 1[1]	2.5 (±.2)	Not available	1263.7 (±278.4)	47.5 (±6.2)	58.4 (±5.9)	na	27.3 (±5.6)
Region 2	1.7 (±.1)	8.9 (±0.2)	1849.6 (±241.2)	90.9 (±3.3)	40.1 (±5.3)	135.9 (±10.7)	47.6 (±5.7)
Region 3[2]	1.6 (±0)	6.8 (±0)	2386.8 (±0)	31.9 (±0)	27.2 (±0)	113.4 (±0)	36.8 (±0)
Region 4	1.8 (±.2)	10.0 (±0)	2302.4 (±523.0)	35.3 (±5.7)	60.1 (±5.6)	180.4 (±16.8)	27.3 (±5.5)
Region 5	3.0 (±.3)	20.0 (±0)	1562.9 (±395.6)	85.1 (±4.5)	70.4 (±5.7)	181.6 (±20.0)	18.5 (±5.0)
Region 6	3.0 (±.3)	31.1 (±0.5)	2242.6 (±349.6)	15.4 (±3.9)	57.1(±5.5)	259.2 (±21.9)	32.5 (±5.2)
Region 8	2.7 (±.2)	9.4 (±0.2)	901.8 (±105.2)	100.0 (±0)	30.2 (±4.8)	113.3 (±11.2)	29.0 (±4.7)
Region 9	2.8 (±.2)	15.0 (±0)	1265.9 (±120.4)	100.0 (±0)	14.5 (±4.5)	76.4 (±10.0)	36.3 (±5.2)

Note: Sampling errors are in parentheses.

[1]Rollbacks could not be calculated for Region 1 because of the methodology used in that region to establish rollbacks. This precluded the use of Region 1 in any analysis involving rollbacks or appraised prices.

[2]All sales for Region 3 were sampled.

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